ARCHIVES OF OPHTHALMOLOGY.

DISCRETE LYMPHOID INFILTRATION OF THE ORBIT.

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(With three figures on Text-Plate No. V.)

THE following case is reported as an example of a condition of which only two other instances seem to have been recorded. It raises also some interesting speculations relative to the obscure groups of the lymphomatoses.

SUMMARY.

Proptosis of the right eye forwards and slightly upwards and outwards, of ten months' duration in a man aged 37. Movements practically full. Firm resistance to backward pressure. Some enlargement of the retinal veins and blurring of the outline of the disk. Vision with correction R. = $\frac{6}{6}$ pt.; L. = $\frac{6}{6}$. Exenteration of orbit. Seven years later commencing similar affection on the left side. Patient's health perfect throughout. Physical examination revealed no abnormality. Blood examination negative.

Pathologically. Orbital tissues strewn throughout with numerous isolated nodules of lymphoid tissues situated chiefly in the fibrous trabeculæ and along the larger vessels. These nodules are composed not only of lymphocytes, but also of fully developed lymph follicles. No special concentration of the changes in the vicinity of the fornix or lacrimal gland. No microörganisms demonstrable.

The patient, Nathan V., a Jew, aged 37, first came under medical observation at the London Hospital on April 4, 1907. Mr. A. Roxburgh kindly informs me that at this time he was suffering from proptosis of the right eye. A small growth, believed to be an adenoma of the lacrimal gland, was removed, but without improvement in the local condition. He was readmitted in October, 1907, when an exploratory operation was undertaken, and showed the presence of a growth filling the back of the orbit. Exenteration was advised but was refused.

On November 13, 1907, he was admitted to the Royal London Ophthalmic Hospital under Mr. Gunn where the following notes were made by Mr. A. C. Hudson. He stated that the prominence of the eye had commenced seventeen months previously, and had gradually increased. There had been no pain or diplopia, and he had never suffered from toothache, or from nasal discharge or hemorrhage. Vision had not been affected.

On the right side there was great soft œdema of the lids with much venous congestion of the conjunctiva, especially below. An elastic tumor was felt in the upper-inner angle of the orbit. It appeared to be attached to the bone and was not movable. There was no pulsation or bruit. The globe was displaced considerably forward and slightly upwards and outwards. Movements appeared to be full, but with the Maddox rod diplopia was elicited indicating an upward and outward displacement compensated by 2.5° and 1.5° prisms. There was firm resistance to backward pressure. In both fundi the disks had rather blurred outlines and the veins were enlarged. Vision with correction of slight myopic astigmatism, R. = $\frac{6}{6}$ pt.; L. = $\frac{6}{6}$. Fields full.

There was no evidence of visceral disease. The spleen was not hypertrophied and the resonance over the sternum was unimpaired. No lymphatic enlargement. The right antrum was less translucent than the left, but there was no displacement of the bony walls or obstruction of the right nasal passages; the right first molar was carious. A subsequent X-ray examination showed no bony abnormality.

On November 16, 1907, the right orbit was exenterated. The growth appeared to be continuous with tumor tissue in the ethmoidal region and antrum, and the bony walls of the orbit were thought to be eroded on the inner side and below. A single Thiersch graft was subsequently applied to the denuded surface (see Hudson, *Trans. Ophth. Soc.*, vol. xxviii., p. 213, 1908) and healing was uneventful.

An examination of the blood on December 10, 1907, gave the following result:

Red corpuscles	4,642,000
Leucocytes	12,620
Hæmoglobin	90%

Differential leucocyte count:

Polymorphs	64.5%
Mononuclears (large and small)	33.0%
Eosinophiles	2.5%
Mast cells	?

Blood platelets somewhat abundant.

The patient has been under intermittent observation since. In March, 1910, Dr. Duncan Davidson reported that he was quite well and had maintained his weight. There was no glandular enlargement or local recurrence and the vision and movements of the other eye were perfect.

On February 6, 1914, he was admitted to hospital under Mr. Hudson with conjunctivitis of the left eye. On the 26th it was noted that the lids were slightly œdematous and it was thought that upward movement was a little deficient.

The fundus was noted to be rather pale, the veins dark and distended; on June 11th, however, it was passed as normal. On March 17th, Dr. James Taylor reported that he could find no abnormality of the heart or blood-vessels. On July 13th proptosis of the left eye was marked. Upward movement was very poor, inward and outward limited; there was no ptosis. Vision $\frac{6}{6}$. No fundus change except slight fullness of the veins. On Sept. 26, 1914, there was some swelling of the lids, enlargement of the conjunctival vessels, and slight chemosis near the outer canthus. There was no hypertrophy of the lymphoid tissue of the conjunctiva, or formation of follicles in the fornices. The orbital tissues generally, especially on the inner and outer sides, gave an elastic resistance to backward pressure. The preauricular gland on the left side was just palpable. Subsequently (Oct. 6th) some pea-like bodies (? lymphoid nodules or lobules of orbital fat) could be felt in the upper-outer part of the orbit. The Wassermann reaction, tested on July 20th, was negative.

Differential leucocyte counts were undertaken by Mr. S. H. Browning on two occasions, with the following results:

March 2, 1914.

Polymorphs	62.6%
Lymphocytes	28.6%
Large mononuclears	4.3%
Eosinophiles	4.3%

June 6, 1914.

Polymorphs	67.3%
Lymphocytes	25. %
Large mononuclears	4.6%
Eosinophiles	2. %
Mast cells	1. %

On March 19, 1914, secondary anæmia is noted. Red corpuscles 3,600,000.

Pathological Examination.—On examining the exenterated orbital contents it appeared at first as though no abnormality were present. Closer scrutiny however revealed a number of small yellow points, which proved on microscopical examination to consist of small discrete lymphoid nodules, scattered everywhere throughout the orbital tissues (Fig. 1). In general they are situated within, or in the vicinity of the fibrous trabeculæ rather than among the fat lobules, the appearance of free nodules in the latter situation being probably due to peripheral section. This distribution corresponds with an intimate association between the nodules and the orbital vessels. In the vicinity of all the larger nodules and aggregations of nodules an artery of some size is found, and few of the larger arteries are without such an accompaniment. In general the artery does not run through the actual lymphoid masses, but rather forms a center round which the individual follicles are grouped, like buds, some on one side, some on another, but seldom forming a complete sheath in any one part of the course of the vessel (Fig. 2). The veins are also accompanied by lymphoid infiltration but less constantly and rather in the form of sheaths of lymphocytes than of fully developed true follicles. The smaller arteries and veins, especially those within the fat lobules, are not infrequently free from infiltration.

Tracts of lymphocytes follow the vessels among the fibers of the orbital muscles; in places also, especially in the neighborhood of the larger vessels, there are well developed nodules of true follicular tissue within the muscles. As a rule, the muscle itself has undergone little or no structural alteration; in places, however, the infiltration is more intimate and there is possibly some breaking down of the fibers (Fig. 3). The vessels themselves are healthy.

The lymphoid tissue of the tarsal conjunctiva presents no abnormality; it is small in amount and contains no follicles. Above the level of the tarsus and in the fornix, lymphocytes become more abundant, and one or two small follicles, deeply buried in the tissues and surrounded by more diffuse infiltration, are demonstrable. Some of the smaller vessels of the bulbar conjunctiva are clothed with

small collections of lymphocytes. The typical discrete infiltration of the orbital tissues only commences some distance farther back, and although one or two small intermediate patches may be found there is no intimate connection between that infiltration and the lymphoid tissue of the fornix, nor do any continuous strands or tracts lead from one to the other. The conditions are the same in the upper and lower fornices.

A somewhat more intimate association subsists between the abnormal infiltration and the lacrimal gland. Nodules are found in contact with, and among the lobules of the gland, and in places even, there is a more diffuse infiltration, with some disorganization and atrophy of the acini. Plasma and other inflammatory cells are present in moderate numbers in the conjunctival fornices and among the glandular acini.

Histologically the nodules are composed of the following elements: (1) Lymphocytes, disposed for the most part in the periphery. (2) Larger mononuclear cells, with more abundant protoplasm and a paler nucleus, often showing well developed chromatin dots. These cells form the bulk of the central portion of the nodules. (3) Some still larger elements often lying in the center of a space. The nucleus is frequently overgrown and not uncommonly multiple. The cell body is large, and intraprotoplasmic granules are common. (4) A few plasma cells are present near the nodules but they do not form a marked feature of the infiltration.

From this description it will be seen that all the elements of a true follicle are present. Moreover their arrangement is perfectly typical—the lymphocytes in the periphery, while the larger mononuclear cells form a paler "germ center." The largest cells with granules in their protoplasm correspond with Leber's "Körperchenzellen" which are characteristic elements not only of trachoma follicles, but also of lymphatic glands, and of lymphoid tissue generally. The nodules are traversed by a system of fine vessels which is better developed than is usually the case in trachoma follicles or in the follicles of lymphatic glands. Except for slight penetration of the peripheral lymphocytes among the neighboring fat cells the nodules are usually sharply circumscribed; and in considerable areas the orbital adipose tissue has a perfectly normal appearance.

No bacteria could be found in sections stained by Gram's method.

The only other cases known to me which present any real resemblance to the present are the following two recorded by

Birch-Hirschfeld (*Graefe-Saemisch Handbuch*, II. Teil, IX. Bd., XIII. Kap., p. 497, 1909; *Ber. d. Ophth. Gesellsch. Heidelberg*, xxxii., p. 127, 1905):

1. A man aged 37 had noticed prominence of the left eye for three weeks. He was, and had always been, healthy. No pain. Blood examination negative. No swelling of lymphatic glands. Left globe displaced 9*mm* straight forwards. Movements limited equally in all directions. No local tumor palpable. Vision almost normal, disk slightly hyperæmic but with sharp edges. Since the exophthalmos increased considerably under the use of pot. iod. and arsenic, a Krönlein operation was performed. No local tumor was found but all the retrobulbar tissues were of a firm consistence suggesting a diffusely infiltrating sarcoma. The orbit was exenterated.

Two and a half months later he returned with considerable exophthalmos of the right eye, which had developed painlessly during the preceding fortnight. Here also the displacement was straight forward, the vision and fundi normal, the ocular movements limited equally in all directions. In spite of energetic treatment with pot. iod., iodipin, and arsenic the exophthalmos increased from 4.5*mm* to 12*mm* and the eye was lost from a perforating ulcer. Subsequently the exophthalmos slowly subsided. Four years later there was no enlargement of lymphatic glands nor any deterioration in his general health.

Microscopical examination showed the orbital tissues to be sown throughout with numerous areas of lymphoid tissue. Sheaths of lymphocytes clothed the vessels, and infiltrated the muscles and adipose tissue. In many places there was a development of typical follicles exactly resembling trachoma follicles. Endothelial proliferation and hyalin degeneration were present in many of the vessels. There were no hemorrhages, necrotic areas, giant cells, or collections of polymorphonuclear leucocytes, but typical plasma cells were present in considerable numbers in the periphery of the patches. Bacteria were absent.

2. A woman, aged 23, had always been healthy except for purpura two years before. There was no evidence of syphilis, tubercle, leucæmia, pseudoleucæmia, or any other constitutional or local disease. In the inner-upper angle of the left orbit a firmly resistant mass was palpable, which stretched back into the depths of the orbit. It was closely connected with the bone, left the skin intact, and caused slight ptosis and an exophthalmos of 3*mm*. Movement was

limited in an upward direction only, the fundus was normal, and vision unimpaired.

After unsuccessful treatment with pot. iod. a piece of the tumor was excised, when it was found that the growth extended from the inner almost to the outer canthus, and was easily separated by blunt dissection from the periosteum of the orbital roof; in other directions its limits were ill-defined.

Its microscopical characters closely resembled those of the first case—the same lymphoid areas, partly disposed in follicles, partly infiltrating more diffusely; the same vessel changes and infiltration with plasma cells. The subsequent course of the case however was more favorable. Potassium iodide was inefficacious, but the growth and the exophthalmos disappeared under the use of arsenic. During treatment with potassium iodide a small tumor developed on the inner side of the right orbit, but subsequently disappeared. After a period of observation of one year there was no recurrence.

The close resemblance of the present case to these two, and the highly peculiar characters of all three, undoubtedly justify their classification apart. The absence of vascular disease was the only point of any importance in which my case differed from those of Birch-Hirschfeld. The relationship of this group with other forms of lymphoid infiltration of the orbit presents a problem of considerable difficulty.

CLASSIFICATION OF THE LYMPHOMATOSES.

Briefly, the classification of the lymphomata which appears to find most favor with general pathologists may be summarized as follows:

1. The term "simple lymphoma," or "simple lymphadenoma," would be applied to a purely local tumor reproducing accurately the histological characters of lymphoid tissue, and not associated with evidence of any constitutional dyscrasia. It is pointed out by Adami that since lymphoid tissue occurs in nearly every situation in the body it must always be difficult to distinguish such a tumor from a purely local hyperplasia of pre-existing lymphoid tissue. Accordingly some authors do not admit the existence of such a neoplasm; one case, however, is recognized by Adami. For a review of the question from the ophthalmological standpoint, and for a summary of certain

cases which have been reported under this title, the reader is referred to a subsequent paper (p. 235).

2. Tumors of simple lymphomatous type associated with general enlargement of the lymphatic glands and with lymphoid growths in other organs, but without blood changes, are characteristic of the condition known as pseudoleucæmia, or Hodgkin's disease.

3. In lymphatic leucæmia localized tumors of simple lymphomatous type may occur in the orbit as well as in the lymphatic glands and elsewhere. According to Adami the histology of the lymphatic glands differs in pseudoleucæmia and leucæmia; in the former there is overgrowth of the reticular and connective-tissue elements, such as is found in tubercle, with a preponderance of larger cells of endothelial type, and a marked abundance of eosinophiles; in leucæmia the imitation of normal glandular structure is much more exact. These conditions would seem to indicate some unknown inflammatory or irritative element in the etiology of pesudoleucæmia. In neither affection do the tumors show any locally aggressive tendency. The orbital growths of leucæmia (as well as the tumors in the kidney, liver, etc.) appear to be composed of lymphocytes only; whereas a higher differentiation of the lymphoid tissue into follicles has been repeatedly described in pseudoleucæmia[1] (*e.g.* Arnold and Becker, *Arch. f. Ophth.*, vol. xviii., 1872; Boerma, *Arch. f. Ophth.*, vol. xl., 4, p. 219, 1894; Sporleden, *Inaug. Diss.*, Leipzig, 1897; *Nagel's Jahresbericht d. Ophth.*, p. 369, 1897; *Berl. Deutschmann's Beitr.*, vol. iv., p. 498, 1899).

4. A lymphosarcoma is a tumor showing aggressive tendencies, chiefly of a local infiltrative character, invading the nearest, and then the more remote, lymphatic glands, but probably not forming true metastases by way of the blood

[1] In myelogenous leucæmia local tumors are rare and do not appear to have been recorded in the orbit. But chloroma is probably an example of a closely allied disease of the myelogenous hæmopoietic apparatus, in which local tumors, and especially symmetrical tumors of the orbits, are common. The cells of such growths, however, are not lymphocytes, follicles are never formed, and in general lymphoid structure is not imitated. These cases therefore lie outside the domain of the present discussion (see Hudson, A. C., *Roy. Lond. Ophth. Hosp. Reports*, vol. xviii., p. 153, 1911).

stream. Blood changes are absent. In general pathology the term is applied especially to certain mediastinal growths, probably originating in thymus remains, and to tumors commencing in the intestinal submucosa. The cells of such tumors may imitate, or caricature, the normal elements of lymphoid tissue, but apparently the higher differentiation into follicles is not usually attained. It is somewhat uncertain whether unequivocal proof of an origin from lymphoid tissue has hitherto been brought forward in any case of aggressive sarcoma of the conjunctiva, lids, or orbit (see p. 238).

5. The term lymphosarcomatosis designates an excessively rare condition in which the lymphoid tissue everywhere in the body proliferates and infiltrates (Adami). With this disease we are not here concerned.

RELATIONS OF THE LYMPHOMATOSES TO EACH OTHER AND TO THE INFLAMMATIONS.

Opposed to any sharp differentiation along these lines are the views of those who hold that the lymphoid processes are essentially not diverse, but one. The diagnosis, both clinical and pathological, between lymphosarcoma and pseudoleucæmia may be difficult, and lymphosarcoma approximates in many respects to ordinary round-cell sarcoma. It appears to be doubtful how far leucæmia and pseudoleucæmia are really separable; a mere enumeration of the white cells of the blood is not enough; a study of their morphology suggests that changes related to those of leucæmia are not absent in pseudoleucæmia. It is said, moreover, that characteristic leucæmic blood changes may develop, through time, in cases of pseudoleucæmia. According to the view of Türk the lymphocyte-forming apparatus is overactive in all the lymphomatoses alike. If the activity be great, and if it occur in a situation where access to the blood stream is easy, there will be an increase of white cells in the blood; if, on the other hand, access is difficult, there will be no blood changes and local tumors are more likely to form. The orbit, with its imperfect lymph apparatus, exemplifies these latter conditions, hence the comparative frequency of tumors in that situation.

Again, considering the important part played in inflamma-

tions by lymphocytes as an individual cell-type, and by lymph follicles, it may evidently be a matter of considerable nicety to apportion the relative shares of inflammation and new growth in some of these cases. Clinically at least, tubercle may imitate pseudoleucæmia, and, as has been seen, there may be some similarity in the histological changes in the glands.

From this standpoint the whole lymphoid group may be regarded as forming a series, bordering on the one hand on the chronic inflammations, on the other on the neoplasms; and an analogy will present itself (Adami) between lymphoma and fibroma, between pseudoleucæmia and the chronic hyperplastic inflammations, and between lymphosarcoma and the more undifferentiated forms of sarcoma.

In some instances again an overgrowth of lymphoid tissue may be neither an inflammation nor a neoplasm in the ordinary sense, but rather a response to some unknown bodily need. There is an age when the functions of the lymphoid-tissue-forming apparatus are active—the age of adenoids, enlarged tonsils, and conjunctival folliculosis without inflammation.

For the present, it would seem, we are not in a position to pronounce a final judgment on these problems. In the future perhaps some larger generalization may supply the correlating link.

THE OCULAR LYMPHOMATA OF LEUCÆMIA AND PSEUDO-LEUCÆMIA.

Passing from these difficult general questions, it may be said, as regards the local ocular manifestations of the lymphomatoses, that most symmetrical tumors of the eyelids and orbit belong to this group.[1] The tumors are commonly multiple and situated in the eyelids; they rarely invade the orbit deeply; they usually appear simultaneously with enlargements of lymph glands, etc., elsewhere, and with other signs of a constitutional affection. Instances are recorded,

[1] A few are due to the simultaneous invasion of both orbits by a sarcoma arising in some central situation, such as the sphenoid; a very few perhaps to invasion from one orbit to the other by way of the optic nerve or the sphenoid. It is doubtful if v. Mikulicz's disease should be classified apart from the pseudoleucæmic lymphomata.

however, in which the orbit has been the seat of a lymphoid tumor while the lids remained free (Ahlström, *Klin. Monatsbl. f. Augenh.*, vol. xlii., 2, 276, 1904); of orbital preceding general signs by a period of two months (Ahlström); of an interval of three years between the involvement of the two orbits (Bronner, *VIIIth Internat. Ophth. Congress*, p. 202, 1894); and, in four or five cases (in some of which the diagnosis was doubtful or the period of observation short) of a unilateral incidence of the affection.

DERIVATION OF THE LYMPHOMATA.

Regarding the origin of lymphoid tumors in general widely divergent opinions have been expressed, and the orbit has been the battleground of contending schools. According to one the growths arise from similar cells preëxisting in the tissues; according to the other they originate, by diapedesis, from the lymphocytes of the blood. One side considers that the tumors supply lymphocytes to the blood; the other that the blood supplies lymphocytes to the tumors. Those who derive the tumors from the blood appeal to the fact that lymphoid tissue has never been demonstrated beyond cavil in the normal orbit, and still less in the choroid where also lymphoid infiltrates occur.[1] In reply to this objection the upholders of an origin from preëxisting tissue cells point out that although lymphoid tissue may be absent from the orbit proper, it is present in two closely adjacent situations—the conjunctiva and the lacrimal gland. In agreement with this localization the majority of lymphoid tumors have been situated in the eyelid or lacrimal gland, or at least far forward in the orbit; indeed in some instances the conjunctiva itself has actually shown tumor formation (*e.g.* Axenfeld, *Arch. f. Ophth.*, vol. xxxvii., 4, p. 102, 1891; Boerma, *Arch. f. Ophth.*,

[1] This question of the presence or absence of a lymphatic apparatus in the orbit has recently been subjected to renewed investigation by Birch-Hirschfeld (*Graefe-Saemisch Handbuch*, II. Teil, IX. Band, XIII. Kap., p. 261, 1909). In agreement with other observers he has been unable to find definite areas of lymphoid tissue; in the orbits of animals also he has never found follicles. His observations mostly referred to the orbits of newly born infants. He believes that a system of lymph *vessels* is demonstrable, but this question scarcely concerns the present discussion.

vol. xl., 4, p. 219, 1894; Berl., *loc. cit.*; Collins, *Roy. Lond. Ophth. Hosp. Rep.*, vol. xiii., p. 248, 1893; Hudson, *Roy. Lond. Ophth. Hosp. Rep.*, vol. xviii., p. 153, 1911).

The more difficult case of lymphoid infiltration of the choroid (and also of the dura mater) in leucæmia has received various explanations.

1. That the lymphocytes are not really in the tissues but in the vessels, the walls of which are swamped and rendered invisible by the dense crowds of cells (Oeller).

2. That the infiltration is a secondary invasion from an orbital growth.

These two explanations certainly do not apply to all cases.

3. That the cells are truly heteroplastic—derived from other types of mesoblastic elements (Berl). It seems somewhat unlikely that a connective-tissue cell and a blood cell like a lymphocyte should be capable of this species of interchange. Hudson considers that possibly in leucæmia the endothelium may undergo a vicarious proliferation to compensate for a defective supply of mature blood cells from the bone marrow.

4. That under the "leucæmic stimulus" individual isolated lymphocytes may undergo proliferation and form local tumors (Meller). This explanation rests on a somewhat speculative basis.

5. The hypothesis of the opposite school—that the infiltrates are due to diapedesis from the blood. While possible enough in the case of leucæmic infiltrates of the choroid, this explanation is not easily capable of a general application to the case of lymphoid tumors without blood changes.[1]

On the whole the probabilities seem to be in favor of an origin of lymphoid tumors from preëxisting cells of the tissues, the condition being a local expression of a general overactivity of the lymphopoietic apparatus; but perhaps the time has scarcely come for a final decision on the subject. For a fuller consideration of these and cognate points, the reader is referred to the papers of Birch-Hirschfeld (*loc. cit.*),

[1] Lymphoid infiltration of the choroid has been recorded in leucæmia only, not in pseudoleucæmia.

Meller (*Arch. f. Ophth.*, vol. lxii., p. 130, 1906; *Zeitschr. f. Augenh.*, vol. xv., p. 538, 1906), and Hudson (*loc. cit.*).

APPLICATION TO THE PRESENT CASE.

In the foregoing pages an endeavor has been made to present a general conspectus of modern views with regard to the lymphomatoses. In reality, however, much of this discussion is only indirectly germane to the present case, which differs in important particulars from all the above-mentioned conditions.

1. With the exception of the small nodules noted at the last examination (on the more recently affected side) there were no tumors large enough to be individually palpable. The "elastic tumor" mentioned in the clinical history probably consisted of displaced orbital tissues.

2. The condition was purely orbital; in particular there was no clinical evidence of an affection of the conjunctival lymphoid tissue or of a special localization in the lacrimal gland.

3. The discrete scattered nodules with well developed follicles were quite unlike the local formations of the true lymphomata.

4. The long interval between the involvement of the two orbits would be at least extremely exceptional in the lymphoma group.

One must agree with Birch-Hirschfeld therefore that the condition has closer affinities with the inflammations than with the neoplasms. Follicle formation is a well recognized response to an inflammatory stimulus, as is exemplified, for instance, in trachoma. It is true that it has been described also in pseudoleucæmic tumors; but apart from the fact that these pseudoleucæmic tumors, as has been seen, have themselves been suspected to have an inflammatory basis, the occurrence in the present condition of crops of isolated follicles along the vessels, the presence of plasma cells, and (in Birch-Hirschfeld's case) the observation of vascular disease—these are points much in favor of an inflammatory origin. The appearance of aggressive diffuse infiltration, and of disorganization of the tissues, in the present case was exceptional, and may have been due to interference with nutrition from mere overcrowding of the tissues with cells.

With regard to the genesis of the lymphoid tissue in the present case, the appearances were not such as entirely to exclude an origin from the conjunctival fornix or lacrimal gland; if Birch-Hirschfeld's views on the occurrence of lymphatic channels and vessels in the orbit be correct, the spread of the lymph nodules from these situations, and their distribution along the main vessels, where the perivascular lymph channels would presumably be best developed, would receive a sufficiently intelligible explanation. Yet in view of the fact that in neither of Birch-Hirschfeld's cases, nor in my own, was there any clinical evidence of a primary affection of the fornix or lacrimal gland, nor of any special concentration of nodules in their vicinity, it seems more probable that the follicles were locally deposited in response to the inflammatory stimulus, and that the conjunctiva and lacrimal gland merely shared in a general process. The mucous membrane of the ethmoid cells fell under suspicion at the time of operation, but on the whole the subsequent course of the case, and the peculiar character of the infiltration, seem to preclude this source.

The above analysis leaves many points totally obscure. The bilateral incidence, even after a long interval, would seem to point to some general dyscrasia, but what was its nature in a man who had apparently always enjoyed perfect health and who showed not even the beginnings of any constitutional disease after a period of observation extending over seven years? Again, why should the follicle formation occur in the two orbits and apparently nowhere else in the body; or may similar small scattered follicles have been present elsewhere without producing visible signs? The answer to these and kindred questions must rest on the basis of a larger material than is at present at our disposal.

DESCRIPTION OF FIGURES.

FIG. 1 (x 12). General view.

FIG. 2 (x 35). A higher magnification of one of the follicles showing its relations with a large artery (A). Some infiltration is present in the arterial wall itself, and a smaller artery below is ensheathed (B). A small collection of lymphocytes is also seen near an artery to the right (C).

Fig. 3 (x 150). More diffuse infiltration of the tendon of one of the ocular muscles.

ILLUSTRATING DR. COATS'S ARTICLE ON "DISCRETE LYMPHOID INFILTRATION OF THE ORBIT."

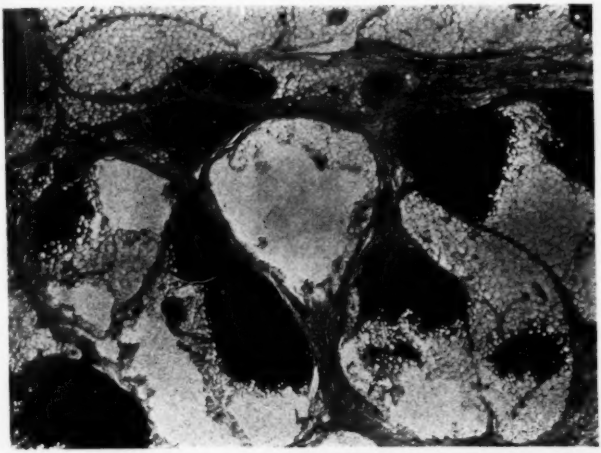

FIG. 1.—General view. (x 12.)

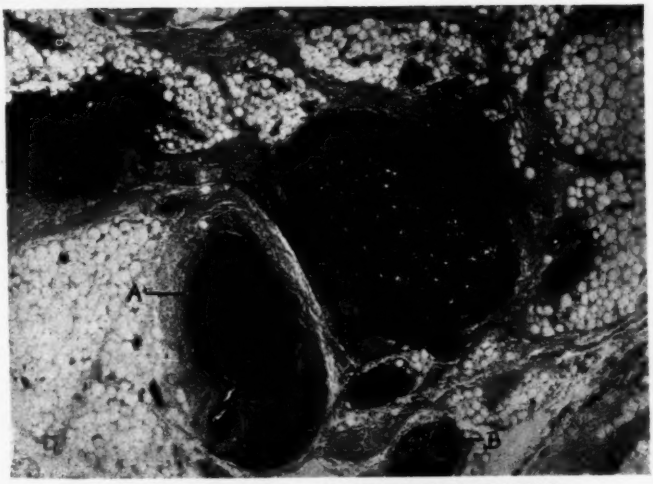

FIG. 2.—A higher magnification of one of the follicles showing its relation with a large artery (A). Some infiltration is present in the arterial wall itself, and a smaller artery below is ensheathed (B). A small collection of lymphocytes is also seen near an artery to the right (C). (x 35.)

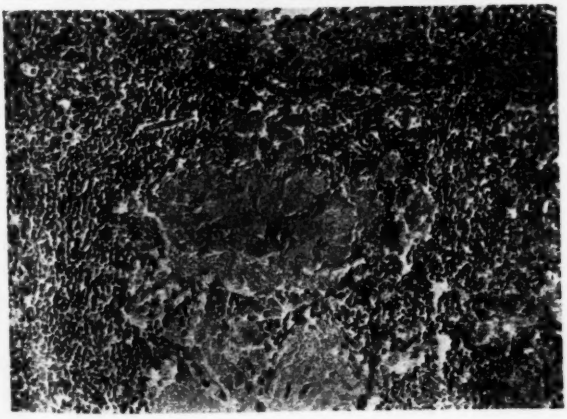

FIG. 3.—More diffuse infiltration of the tendon of one of the ocular muscles. (x 150.)

LYMPHOMA AND LYMPHOSARCOMA OF THE CONJUNCTIVA

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(With three figures on Text-Plate No. VI.)

I

LYMPHOMA

THIS specimen was derived from a small tumor of the plica semilunaris. The clinical diagnosis was "fibroma," but the original notes having been lost no further details are available.

Microscopically the growth may be said to consist of a single gigantic lymph follicle (Fig. 1) measuring 3.25*mm* in diameter. The imitation of normal lymphoid tissue is quite perfect. The main mass is composed of a "germ center" of comparatively large pale cells, among which the usual still larger elements with granular inclusions ("Körnchenzellen") are fairly abundant. This center is clothed with a mantle of typical lymphocytes, which in one place throws a strand across the follicle, dividing it into a larger and a smaller segment. Cells of the germ center type also occur outside this mantle on its deeper aspect. Vessels are small and scanty within the follicle; karyokinetic figures are not uncommon. The vessels of the vicinity have sheaths of lymphocytes, and a few cells of the same type invade the deeper layers of the epithelium, but in general the nodule is very well delimited from its surroundings; there is, however, no definite fibrous tissue capsule. A little lymphoid tissue is present in the adjacent conjunctiva, and in one situation a very minute deeply buried follicle is demonstrable.

In the preceding paper (p. 221) the question was discussed whether a diagnosis of simple lymphoma is ever justified,

some pathologists holding that if the imitation of lymphoid tissue is exact then the differentiation between a chronic inflammatory hyperplasia and a true neoplasm is impossible; while, on the other hand, if the imitation is imperfect then the term "simple lymphoma" is erroneous. Without entering into this controversy, it is sufficient to say that if the name be appropriate to any condition it is to one such as the present, where a local, prominent, circumscribed tumor grew from the plica, without, probably, any other lesion of the conjunctiva. Yet even here the discovery of another follicle, however small, suggests that inflammatory hyperplasia may have played a part.

The following are the scanty similar observations which I have been able to find.[1]

1. Case of Koerber (*Zeitsch. f. Augenh.*, vol. x., p. 148, 1903). Female aged 14, in good health. Injury to L. six months previously with hot prune juice. Soft, freely moveable pink tumor the size of a pea, attached to the plica. Conjunctiva otherwise normal. Microscopically the tumor consists of a single nodule composed of lymphocytes with a few larger cells, and surrounded by a connective-tissue sheath. Scanty stroma within the nodule.

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[1] Certain conditions to which the name "Lymphoma" has been applied are here excluded from consideration, viz.:

1. The leucæmic and pseudoleucæmic tumors mentioned in the preceding paper.

2. A peculiar type of diffuse lymphoid infiltration affecting the tarsal conjunctiva (Baslini, *Clin. Oculist*, 1907, May; *Nagel's Jahresbericht*, 1907, p. 187; Nathausen, quoted by Cosmettatos, *Arch. f. Augenh.*, vol. lxvii., p. 391, 1910), fornix and its vicinity (Valude and Morax, *Ann. d'Oc.*, vol., cxxvii., p. 190, 1902), or bulbar conjunctiva (v. Duyse, *Arch. d'opht.*, vol. xxv., p. 402, 1905; Uhthoff, quoted by v. Duyse, *loc. cit.*).

3. A condition described by Goldzieher (*Centralb. f. prakt. Augenh.*, p. 112, 1893) in which a development of colossal follicles in both lids of one eye is associated with enlargement of the cervical glands. The description strongly suggests an inflammatory lesion.

4. A disease mentioned by v. Michel (*Lehrb. d. Augenh.*, 2d ed., p. 199, 1890) in which a reddish gray thickening of the conjunctiva in the palpebral fissure, and sometimes surrounding the cornea, is associated with multiple enlargement of lymphatic glands.

The propriety of designating some of these conditions "Lymphoma" need not here be discussed; all of them differ essentially from the case now under consideration.

2. Case of Morax (Soc. d'opht. de Paris, July 7, 1908, *Rec. d'opht.*, pp. 174 and 301, 1908). Male aged 19. At inner angle of eye separated from caruncle by a space of 1*mm*, a yellowish red, conical tumor measuring 9–10*mm* vertically, 7–8*mm* horizontally, 5*mm* in height; firm in center, softer at sides; not attached to sclerotic. A similar smaller lobulated growth was present in the other eye. Microscopically composed of diffuse cellular infiltration and some fairly voluminous nodules. Cells have an irregularly spherical nucleus, and little protoplasm; no granule cells or giant cells; polynuclear leucocytes rare; surrounding tissues vascular; no well defined capsule. Morax considers the condition to be either a chronic inflammation or "that type of lesion which is described under the name of lymphoma."

3 Case of Teulières (*Rec. d'opht.*, p. 161, 1910). Male aged 15. A tumor of fairly firm consistence measuring 8*mm* by 5*mm* grew from bulbar conjunctiva, 5*mm* outside the caruncle. Of some years' duration. Mobile on the sclera. Consists of typical lymphoid tissue in full activity of development.

4. Case of Cosmettatos, (*Arch. f. Augenheilk.*, vol. lxvii., p. 391, 1910). Male 18. Enlarged tonsils and cervical glands. On bulbar conjunctiva close to limbus a small, flattened, pale red, soft, smooth tumor measuring 8*mm* by 5*mm*. History of eight years' duration. Conjunctiva and fornix otherwise normal. Blood normal. Microscopically composed of lymphoid cells, in places collected into masses of various forms and separated by fibrous strands; in places the infiltration is more diffuse, but contains here also small lymph nodules.

Analyzing these results, it would seem that simple lymphoma has been observed in young people (average 16.5 years; 3 male, 1 female) and is a tumor of slow development. It has grown always from the inner portion of the conjunctiva—three times from the plica, once from a point 5*mm* outside the caruncle, once near the limbus. Once there was a history of previous injury; once the tumor was bilateral and symmetrical; in no case is mention made of any abnormality of the conjunctival lymphoid tissue elsewhere; in one instance there was simultaneous enlargement of the tonsils and cervical glands. The tumor apparently never attains any very considerable size (largest recorded diameter 10*mm*) even after a lapse of some

years. An absolutely typical formation of follicles with germ centers appears to be described only in the present instance, but may have been present in the cases of Morax and Cosmettatos.

II

LYMPHOSARCOMA

Summary.—Tumor of the left conjunctiva of two months' duration, in a woman aged 29. A pedunculated pale red growth arises from the whole extent of the upper fornix, and in the lower tarsal conjunctiva there are several tuberculated masses. Repeated recurrences after removal. Finally extension back into the orbit, enlargement of a cervical gland, loss of health, and jaundice. Blood examination negative.

Microscopically the tuberculated masses from the lower conjunctiva show in general the structure of lymph follicles, but with certain minor differences. The main tumor consists of similar cells in larger masses, and with more tendency to a diffuse infiltration and invasion of the surrounding tissues. The recurrences show aggressive infiltration of a highly malignant type.

A woman, aged 29, came under the care of Mr. Lang at the Royal London Ophthalmic Hospital on February 5, 1906.[1] About the beginning of December, 1905, she had observed a slight swelling in the outer-upper part of the left upper eyelid. Something could be felt slipping about beneath the lid and pushing it forward. There was no pain, redness, or discharge. Fourteen days before her visit a tumor began to present in the outer part of the palpebral fissure. It was increasing fairly rapidly in size, and was associated with slight conjunctival discharge.

A pale red swelling was observed, protruding from beneath the upper lid, and filling the palpebral fissure in its outer part. It measured about 2.5*cm* by 1.5*cm*, was smooth on the surface, of solid consistence, and somewhat vascular. It covered a little more than one third of the upper-outer quadrant of the cornea. On raising the upper lid it was seen to arise by an elongated pedicle from the whole extent of the fornix, but with a broader attachment on the outer side. In the lower tarsal conjunctiva there were several raised, pale

[1] The earlier history of this case has already been reported by Henderson (*Trans. Ophth. Soc.*, xxvi., 1906, p. 32).

tuberculated masses. The globe was intact; no exophthalmos, or limitation of movement, no invasion of the orbit.

The patient's health was, and had always been, good. A brother had suffered from "consumption of the bowels," a nephew from tuberculosis of the ankle. A blood examination gave the following results:

Hæmoglobin	85%
Red corpuscles	3,400,000
White corpuscles	5,800
Polymorphonuclears	57%
Lymphocytes	33%
Large mononuclears	8%
Eosinophiles	1%
Mast cells	1%

On February 26th the pedunculated tumor and as much as possible of the growth in the fornices were removed. On March 10th there was recurrence along the whole line of the upper fornix. The lower fornix was thickened and nodular, but without definite tumor formation. A further excision was performed but the growth recurred once more and was again operated upon in July. A note made on Oct. 13th stated that the fornices were free, but that a granular-looking mass 5*mm* in diameter and covered with minute spots of hemorrhage projected from the outer half of the tarsal conjunctiva. In the bulbar conjunctiva and surrounding the inner half of the cornea there was a raised gelatinous-looking swelling which appeared to encroach on the edge of the cornea. An enlarged gland was palpable in the neck.

A month later the growth was spreading back into the orbit, and the patient was jaundiced and had obviously lost flesh. She was referred to a general hospital, but no details of her further progress are obtainable.

Microscopical Examination. Specimens from the lower conjunctival fornix, from the pedunculated growth, and from the recurrent nodules are available. In the first of these the incipient stage of tumor formation is plainly manifest. The imitation of lymph follicles is unmistakable (Fig. 2). Isolated rounded agglomerations of cells are separated and delimited by fibrous strands quite in the manner of trachoma follicle formations. A more minute inspection however reveals certain points of distinction.

(1) Lymphocytes are present in the periphery in small numbers only, and do not form a complete mantle round the germ center as in ordinary follicles.

(2) The cells, and especially the cell nuclei vary more in size. Some very large deeply stained nuclei with prominent

chromatin dots are visible. In general the nuclei are comparatively large, and round or slightly irregular in figure; chromatin dots are common; the protoplasmic body, while not very large, considerably exceeds that of a lymphocyte.

(3) On the other hand large cells with granular inclusions (granule cells, Körnchenzellen) are very scanty and multinucleated cells appear to be absent; an intercellular reticular stroma is easily demonstrable.

The cells show little tendency to transgress the limits of the follicles; in the surrounding trabeculæ there are some small tracks of lymphocytes, and one or two isolated plasma cells. No plasma cells can be found at any considerable depth within the follicles.

A further stage in the evolution of the growth is exemplified by the collection of similar cells into larger masses, which now no longer resemble follicles. The limits of the nodules are still fairly well defined however, though strands of cells extend into the surrounding tissues. The surface epithelium is rarefied, and to some extent invaded from below. In the vicinity of some of these masses there is a more diffuse infiltration of the conjunctiva, without well defined limits, and with no formation of nodules.

The pedunculated growth represents a further development of the same process. It is composed of uniformly distributed similar cells, for the most part less crowded than in an ordinary round-celled sarcoma. Granule cells are absent. A reticulum is not so prominent as in the follicle-like growths of the conjunctiva, but is traceable. Karyokinetic figures can be found but are scanty. There is a not very abundant, evenly distributed network of vessels, usually with well developed walls. Some round empty spaces may represent the badly formed vessels which are common in sarcoma or may be due to degeneration; the cells in their immediate vicinity, however, are well preserved. There is no necrosis *en masse*, hemorrhage, or pigmentation.

In the recurrences the cells are of the same type, but are more uniform in size and usually more densely crowded; a reticulum is still visible. The recurrences show aggressive infiltration of the most pronounced kind, the cells invading the underlying tissues without restraint and in all directions (Fig. 3).

The differentiation of lymphosarcoma from the ordinary round-celled variety of the neoplasm must of necessity be a matter of some difficulty, especially when exuberant growth has masked some of the original characteristics of the tumor. An unassailable diagnosis would demand:

(1) Clinical evidence of an origin from the lymphoid tissue of the conjunctiva, or at least from a situation where lymphoid tissue is normally present.

(2) Pathologico-anatomical evidence to the same effect.

(3) Histological features not necessarily reproducing with exactitude the characteristics of lymphoid tissue, but at least indicating some of its special peculiarities.

Applying these standards to recorded cases of sarcoma of the conjunctiva it is found in the first place that the vast majority have their origin in the bulbar conjunctiva, especially near the limbus, perhaps because of the frequency of congenital moles in this situation. Since lymphoid tissue is not normal in this situation these may be excluded from the present analysis. Of the cases arising from the conjunctiva of the fornix or lids some have been pigmented, and some spindle-celled. Excluding these also, there remains a very small residue of tumors which, being round-celled, unpigmented, and derived from the tarsal or fornical conjunctiva, may be compared in some measure with the present observation. Of these the following may be quoted:

1. Case of Prout and Bull (*Arch. f. Augenh.*, vol. viii., p. 221, 1879). Female, aged 18. Smooth, flat, hard tumor involving conjunctiva of right lower lid from lid margin to beyond fornix, near outer canthus; slight invasion also above the canthus. Skin free. Trachoma present. Did not grow during a period of six weeks. Microscopically an unpigmented round-celled sarcoma, with some irregularly distributed spindle cells and a few small vessels. Masses of amyloid material in its depths and some amyloid infiltration of the walls of the smaller arteries and capillaries. This may have been a case of amyloid degeneration of the conjunctiva, with the lymphocytal infiltration which always accompanies that condition.

2. Case of Ceppi (Soc. Anat. de Paris, Nov. 26, 1880, *Ann. d'Oc.*, vol. lxxxv., p. 271, 1881). Child aged 5, lobulated, fleshy, firm, elastic tumor, size of a large nut, projecting 0.5*cm* from the left palpebral fissure. Free and mobile, attached only at fornix, appears to be covered with conjunctiva, and adheres slightly to the caruncle. Preauricular gland palpable. History of three weeks' duration. After removal it recurred in two months at the level of the car-

uncle, invaded the orbit, and caused death. Microscopically a round-celled sarcoma.

3. Case of Chisholm (*Virginia Med. Monthly*, May, 1881; *Ann. d'Oc.*, vol. lxxxv., p. 270, 1881). Female, aged 5, delicate and anæmic. Spherical tumor attached to mucous membrane of the fornix by means of a short very vascular pedicle. Microscopically a round-celled sarcoma.

4. Case of Feilchenfeld (*Centralbl. f. prakt. Augenh.*, vol. xii., p. 97, 1888). Female, aged 16. Circumscribed brown-red tumor attached by a broad base to the tarsal conjunctiva of the left upper lid from its margin to the fornix, and occupying the lid laterally nearly as far as the canthus on each side. Conjunctiva rough over the center of the tumor. Microscopically an unpigmented small round-celled sarcoma, with a scanty, fibrous stroma and some large vessels near the fornix. Some invasion of the tarsus. No amyloid degeneration.

5. Case of Roy (*Ann. d'Oc.*, vol. cxl., p. 338, 1908). Male, aged 6. Enlarged cervical glands, tonsils, and adenoids, but otherwise in good health. No evidence of tubercle or syphilis. Pedunculated tumor of right conjunctiva arising from the whole length of the fornix. Covered with conjunctiva but ulcerated in places. Microscopically composed of small round cells of various sizes, with slight fibrous stroma, and in places with a tendency to an alveolar arrangement; here and there the cells are fusiform. Some of the vessels have very imperfect walls. No pigmentation. Rapid growth with invasion of the capsule of Tenon, but no recurrence six months after operation.

6. Case of Rschanitzin (*Klin. Monatsbl. f. Augenh.*, vol. xlvii., ii., p. 167, 1909). Female, aged 7. Enlarged follicles in both conjunctivæ. Swelling of left upper lid of nine months' duration, following a blow. Tumor invading fornix, plica, and caruncle and extending from the inner canthus for three quarters of the length of the lid. The cornea is surrounded by the tumor on the nasal side. Microscopically an unpigmented round-celled sarcoma. The author's second case seems to have originated in the lid, not in the conjunctiva.

7. Case of Esipoff (40 Sitz. d. Moskauer augenärztl. Gesellsch., *Westn. Ophth.*, 1904. Quoted by Rschanitzin). Female, aged 11. Tumor of left lower lid invading plica and

caruncle. Microscopical diagnosis: Round-celled lymphosarcoma.

8. Case of Finden (quoted by Rschanitzin without reference). Female, aged 69. Tumor of conjunctiva of right upper lid. Microscopically an unpigmented round-celled sarcoma.

9. Case of Piccoli (quoted by Rschanitzin without reference). Tumor the size of an almond growing from the plica. Microscopical diagnosis — lymphosarcoma with disease, and in places with obliteration, of the vessels.

Rschanitzin quotes also cases of unpigmented round-cell sarcoma of the conjunctiva reported by Michel and de Vieto Vollaro, but without giving references or exact details.

Analysis shows that the tumors had a broad attachment to the tarsal conjunctiva of the lower lid from the margin to the fornix in the case of Prout and Bull; its situation was similar but in the upper lid in the case of Feilchenfeld; it arose from the fornix in the cases of Ceppi, Chisholm, and Roy; from the fornix, plica, and caruncle in the case of Rschanitzin; from the plica and caruncle in the case of Esipoff; from the plica (the favorite seat also of lymphoma, see p. 237) in the case of Piccoli. In the case of Roy there was hypertrophy of the lymphoid tissue of the tonsils, pharynx, and cervical glands; in that of Rschanitzin enlarged follicles were present in *both* conjunctivæ; in that of Prout and Bull there was trachoma. The preauricular gland was palpable in the case of Ceppi. Lobulation is mentioned by Ceppi; the occurrence of amyloid degeneration by Prout and Bull; of disease of the vessels by Prout and Bull and Piccoli. Growth was rapid in the cases of Ceppi and Roy; slow in that of Prout and Bull. Except in the case of Finden, concerning which few details are available, all the patients were young.

It will be noted that in none of these instances was there specific evidence of an origin from lymphoid tissue; indeed a diagnosis of lymphosarcoma as opposed to ordinary round-celled sarcoma was asserted only in the cases of Esipoff and Piccoli—on what particular grounds is not clear from the abstracts available to me. The attachment of the growth to the fornix by means of an elongated pedicle constitutes a

special point of resemblance between the present case and the cases of Chisholm, Ceppi, Roy, but that this is a feature not peculiar to lymphosarcoma is shown by its occurrence in other forms of sarcoma which have a similar point of origin from the fornix, *e.g.* in spindle-celled sarcomata recorded by Talko (*Klin. Monatsbl. f. Augenh.*, vol. xi., p. 326, 1873) and Dyer (*Trans. Amer. Ophth. Soc.*, vol. ii., p. 538, 1879) and in a melanotic sarcoma reported by Horner (*Klin. Monatsbl. f. Augenh.*, vol. ix., p. 4, 1871).[1] Angiomata in the same situation are also sometimes pedunculated. It would seem therefore that the formation of a pedicle is an accidental circumstance, due most probably to the looseness of the tissue from which the tumor springs, and to the modeling action of movements of the lids.

It may perhaps be claimed that the evidence of an origin from lymphoid tissue is more unequivocal in the present case than in any of these. Clinically the growth began in the fornix where normally lymphoid tissue is found; the "raised, pale, tuberculated masses" suggested a proliferation of lymphoid tissue such as is seen in trachoma; their presence in the conjunctiva of the lower lid, separate from the main tumor mass, together with the extensive involvement of the upper fornix, might seem to indicate that the lymphoid tissue over a considerable area had undergone a simultaneous malignant transformation, but of course invasion by continuity cannot be excluded. The pathological evidence seemed to complete the proof. It showed that the tuberculated masses did in fact closely imitate trachoma follicles, and that between them and the more developed portions of the tumor a series of transitional stages could be traced. In the histological type of its cells also, and still more in the presence of a well developed intercellular reticulum the growth presented points of approximation to normal lymphoid tissue and differed from ordinary round-celled sarcoma. It should be noted that the imitation was of the larger cells of the germ center rather than of the lymphocytes which surround it in the normal follicle. Probably therefore these should be looked upon as the parent cells of the tumor.

[1] v. Duyse and Cruyl (*Ann. d'Oc.*, vol. xcviii., p. 112, 1887) also describe a pedunculated sarcoma attached to the palpebral conjunctiva alone, but without mentioning the form of the cells.

ILLUSTRATING DR. COATS'S ARTICLE ON "LYMPHOMA AND LYMPHOSARCOMA OF THE CONJUNCTIVA."

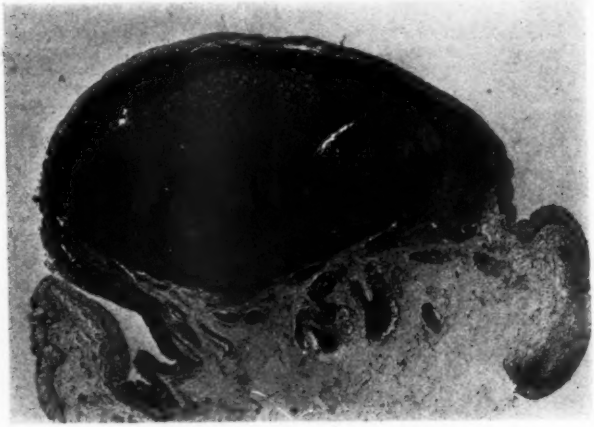

FIG. 1.—Lymphoma of the conjunctiva. The paler "germ-center" is well seen with its mantle of crowded and deeply stained lymphocytes, the whole forming an enormous lymph follicle.

FIG. 2.—Lymphosarcoma of the conjunctiva. An early stage of the growth in which the imitation of trachoma follicles is very clearly visible. (x 25.)

FIG. 3.—From one of the recurrences. Showing diffuse infiltration, with no imitation of follicles, and invasion of the subjacent tissues of an aggressive type. (x 34.)

In one respect a difference from the text-book descriptions of lymphosarcoma is to be noted (see p. 228)—extension appeared to be in part by metastasis and not by local invasion alone. Since, however, when the patient was last seen, an enlarged gland was palpable in the neck, spread by continuity cannot be wholly eliminated. In any case the histological evidence already detailed seems sufficient to establish a diagnosis of lymphosarcoma.

DESCRIPTION OF FIGURES.

FIG. 1. Lymphoma of the conjunctiva. The paler "germ-center" is well seen with its mantle of crowded and deeply stained lymphocytes, the whole forming an enormous lymph follicle.

FIG. 2 (x 25). Lymphosarcoma of the conjunctiva. An early stage of the growth in which the imitation of trachoma follicles is very clearly visible.

FIG. 3 (x 34). From one of the recurrences. Showing diffuse infiltration, with no imitation of follicles, and invasion of the subjacent tissues of an aggressive type.

ANOMALOUS NERVE HEADS WITH GOOD VISION.[1]

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(With one colored plate.)

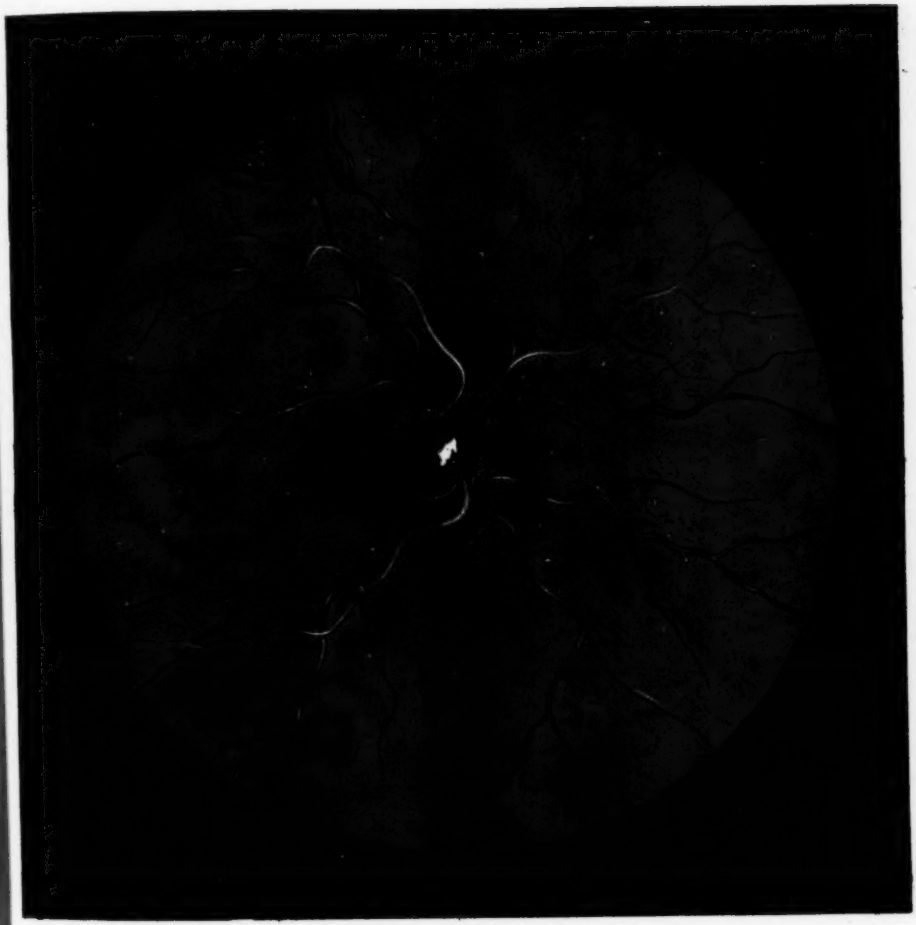
ANOMALOUS nerve head is comparatively rare. A careful study of the contemporaneous literature shows that this interesting condition has not been treated exhaustively.

The few cases reported show great variety in many aspects, so that one experiences considerable difficulty in an attempt at accurate classification, with regard to the diagnosis and histogenesis of this anomaly.

We know that in the lower animals we find pigment quite frequently, the extent largely depending upon the color of the skin. It is found in the lamina cribrosa and may be so extensive as to hide the non-pigmented tissues, so that the nerve head may appear black.

In all birds, many reptiles, and some mammals a special vascular organ, the pecten, is found projecting from the disk into the vitreous. Structurally it is homologous with the ciliary processes, consisting of a vascular plexus covered by pigmented cells, and is probably analogous to them in function as a secreting organ. It occurs in its most complicated form in birds, but it varies considerably in shape in various animals, being most rudimentary in rodents and marsupials. Amongst the latter, the form found in the rat kangaroo, the rabbit-eared perameles, and others is approximated in rare cases in man. These cases, however, are probably not vestigial, but pathologic new-formed vessels (1).

[1] Read before the Chicago Ophthalmological Society, February 16, 1914.



Dr. Goldenburg's Case of Anomalous Nerve Head with good Vision.

As regards the human eye, we know that normally the caliber of the optic nerve is more constricted at the internal than at the external opening, and that there is entire absence of pigment.

Ogawa reports a series of eighteen cases in man, which he has studied, several of which were his own. He found the pigment on the disk to be limited to within 0.2*mm* of the disk margins, the disk margin itself being well defined in all his cases (2).

L. Pick found in microscopic sections of the embryo before the seventh week, when the inner pigment layer of the eye is formed, that well developed pigment strips can be seen emanating from the pigment layer of the eye and extending far into the future optic nerve, long before its fibers are developed. It is probable, he states, that these pigment masses in individual cases continue to persist in the optic nerve instead of retrogressing and accumulate as individual collections of pigment. He is inclined to think that we have to deal with a histologic inhibition.

Ogawa commenting on Pick's hypothesis concedes its attractiveness but maintains that from an embryologic point of view it is not based on absolute facts. He finds himself in no position histogenetically to confirm Pick's brief statement as regards the development of the optic nerve from a stage of pigmentation, for in textbooks on embryology not the slightest insinuation of such a process is recorded.

Ogawa has made microscopic examinations of embryos in the third month and has been unable to detect even a trace of pigment of the optic nerve. Professor Hertwig, whom Ogawa consulted, knew nothing of the pigmentary stage of the optic nerve and indeed repeated and careful examinations of embryos, varying from the fourth to the twelfth week, have not shown any pigment of the optic nerve. From this Ogawa concludes that the optic nerve does not pass a stage of pigmentation embryologically, but that individual pigmented connective-tissue cells occur histologically in the tissue of the lamina cribrosa, and that we have to deal with congenital anomalies.

From an anatomic study of this region in the developed eye, we find that the lamina vitrea is the only membrane that

is in continuous contact with the optic nerve. According to Salzmann the other layers of the choroid are separated from it by the scleral ring or border tissue, as Elschnig calls it. The elements forming the scleral ring probably extend inward in connection with the scleral elements proper, to form the lamina cribrosa. Pigment cells of the choroidea (chromatophores) enter into the composition of the border tissues in varying amount. He further states of the lamina cribrosa: "The majority of the structural elements seem, however, to come out of the border tissue."

One always finds a few fine, elastic fibers radiating out of the border tissue into the framework of the optic nerve at the level of the choroid, but they are limited to the immediate neighborhood of the border tissue. The frame of the choroidal portion of the optic nerve as a whole consists entirely of glia, and only the more outspoken transverse course and the greater size and richness of the fibrillation bring to mind and seem to justify the name lamina choroidalis in the lamina cribrosa (3).

We can conclude, then, that the lamina cribrosa is a continuation of the inner scleral layers and the choroid, and that the border tissue or scleral ring either belongs to the choroid, the sclera, or is a continuation of the pial sheath. Again we may have hypertrophy of existing individual pigment cells, which are frequently histologic in these places, or possibly the presence of migrated germinal masses. Accordingly we may assume that it is quite possible that, instead of the scleral fibers, the choroidal fibers could predominate in the formation of the lamina cribrosa. Furthermore, in view of the fact that the so-called scleral ring, or more correctly speaking, the border tissue, is only a point where the supporting tissues meet and merge, division is made for the purpose of description only. In referring to the scleral ring Salzmann says: "I prefer Elschnig's term, the border tissue, because it does not commit one to anything."

In the light of the above-quoted variable views the following case which has come under my observation presents some interesting features.

W. V., æt. 19, male, negro, came to our clinic for the correction of an alternating squint, which had been present

as long as he can remember. He was born in the South, whence he arrived a comparatively short time ago. His parents are negroes of his type, particularly as regards the intensity of pigmentation. He possesses the average intelligence of one who has had an education equivalent to two or three grades of our public schools. He has a rather high forehead, but aside from that possesses all the typical characteristics of the negro free from racial admixture. There is a history of eye trouble for the past six years, consisting largely in inability to read for any length of time without pain and excessive lacrimation. About five years ago he had glasses fitted. Probably the principal reason that forced him into our clinic was his inability to obtain a coveted position, owing to this squint.

On examination of the eyes last October, we found a concomitant convergent squint present, with the right acting as the fixing eye, although vision is better in the left. He is able at this time to read with his right eye $\frac{20}{80}$ and with his correction $+ 1 \bigcirc + 50$ axis $150°$ $\frac{20}{40}$. The left $\frac{20}{20}$ $+ 1 \bigcirc + 50$ axis $150°$ $\frac{20}{20}$. The tension, cornea, anterior chamber, and pupillary reaction are negative. The iris is heavily pigmented and dilates perfectly, the lens and vitreous are also negative. On examination of the fundus we noted the following peculiar anomaly: an attempt to locate the disk as a preliminary step to a more detailed examination proved apparently futile. Tracing the vessels from the periphery to the point of convergence did not seem to help us in locating anything that might resemble the disk. However, at the point where the vessels apparently come together and where the nerve head should be, we found a very small intensely white spot, that appears with the ophthalmoscope about the width of an artery and in length about two or three times that dimension, with its long axis directed to about two o'clock. The exact nature of this spot we are unable to define at this time. The vessels appeared negative in every respect. The retina is normal with the exception of a marked pigmentation which is very intense in the region of the nerve head, but gradually assumes a lighter shade as we proceed toward the periphery, no evidence of the nerve head or disk margins being present. The fields of vision are markedly contracted, to 20° up, in, and down and 50° out; the margins appearing serrated in outline. The interrelation of colors appears to be normal. The same picture exists in both eyes.

The problems presented by this case are not easy of solution. What is the white spot? Is it the remains of the

hyaloid artery with a possible proliferation of pigment obscuring the disk margins or have we to deal with a small optic nerve with apposition of the disk margins as indicated by the contracted fields? If this condition is to be accepted as inflammatory in character we fail to find a basis for it, owing to the absence of a perivasculitis while the black pigment fades off gradually. The absence of the fine feathery arrangement and the restriction to a limited area speak against the hypothesis of degeneration. The fields give evidence of a markedly reduced number of individual nerve fibers. The color and massed appearance, with the gradual shading off as we leave the center, present the appearance of a preponderance of retinal pigment.

The theory of a pigmentation of the disk is very difficult of reconciliation with many phases of this condition, but on studying the anatomy of this part more closely, we can with some degree of reliability present an explanation of this anomaly.

Judging from the cases of pigmentation of the disk reported in the literature we find this phenomenon is much more common than we have been led to believe. Nearly all the pigment spots, varying from the size of a pin-point to about one fifth the size of the disk, are limited to within the scleral ring; in other words, the disk margins are well defined (4).

Neeper reported a case of annular pigmentation around the disk which obscured about one fourth of the edge (5).

Parsons reported two cases in which pigmentation extended upon the disk. But in none of the cases reported was the entire scleral ring obscured (6).

Beard of Chicago, however, reported a case in 1901 which he described as "Congenital Absence of Optic Disks, Simulating Choked Disk." In his case the disk margins were entirely absent, but no pigmentation was present (7).

The question arises, if pigmentation is present in the disk, where does it come from, and what anatomical cause or causes are responsible for its stopping just at the margin? This must remain unanswered for the present.

It might be well to mention at this time that of all the cases reported, not one has been studied both ophthalmoscopically and microscopically.

Apparently that which appears so well defined on ophthalmoscopic examination in the normal, cannot be so easily differentiated on exact microscopic investigation.

My own case probably represents a marked exaggeration of the pigment cases we have been able to find in the literature, plus a possible small optic nerve, or an optic nerve of unusually small caliber, with the margins of the retina probably in direct contact with each other, so that it obscures the region of the disk, with a marked proliferation of the pigment epithelium.

In conclusion I beg to say that I realize that I have been unable to cover all points of interest, but it is hoped that contributions by men who have opportunities for observation will shed additional light on this rather obscure anomaly.

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PLASMOMA OF THE LACRIMAL SAC.

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(*With four figures on Text-Plate No. VII*)

THE following is believed to be the only case of plasmoma of the lacrimal sac yet reported. It is probable, however, that other cases have occurred but have escaped recognition owing to the infrequency with which the lacrimal sac has been examined microscopically.

K. E., male, 38 years old, married, Armenian laborer; was seen by one of the writers at the Infirmary on December 10, 1912. The history he gave was that nine months previously there was a little swelling in the region of the left tear sac, which broke, discharged, and later healed. Two months later, the swelling returned and has remained.

Examination showed a rounded, hard, elastic swelling rather low down in the region of the left tear sac, 10*mm* long and 8*mm* broad. The swelling did not disappear on pressure. It felt as though it were adherent to the bone. The lower canaliculus had been previously slit. A probe could not be introduced into the sac, and nothing could be evacuated on pressure.

Along the tarsus of the left lower lid, extending from the canthus, was a flat, yellowish growth 6*mm* long and 3*mm* broad and a little less than a millimeter in thickness. In appearance, it was somewhat like granulation tissue, but of harder consistency. The color was a yellowish red. The caruncle was enlarged and surmounted with a curious yellowish, waxy-looking border. The semilunar fold was thickened, and its edge also presented the same appearance.

The conjunctiva of the inner part of the tarsus of the upper lid looked somewhat thickened. The remainder of the conjunctiva of the upper lid was somewhat reddened

ILLUSTRATING DRS. VERHOEFF AND DERBY'S ARTICLE ON PLASMOMA OF THE LACRIMAL SAC.

FIG. 1—Plasmoma of the lacrimal sac, phosphotungstic acid hæmatoxylin stain. The lumen of the sac is compressed owing to the infiltration of the adenoid layer with plasma cells. The hyaline masses are stained black. Hyaline rings may be seen around some of the blood-vessels. Photo magni. x 8.3.

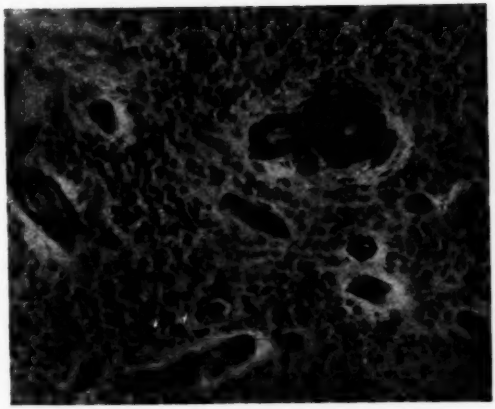

FIG. 2—Showing plasma cells. Also hyaline in walls of small blood-vessels. Photo magni. x 250.

ILLUSTRATING DRS. VERHOEFF AND DERBY'S ARTICLE ON PLASMOMA OF THE LACRIMAL SAC.

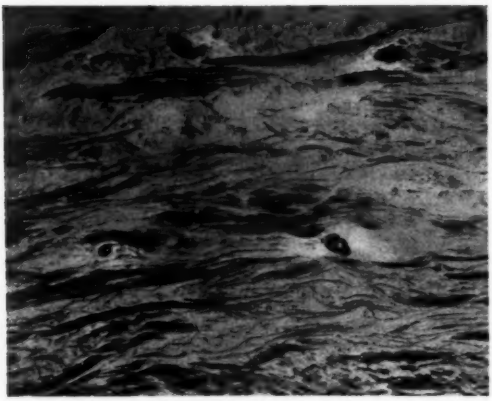

FIG. 3.—Elastic fibres fusing into hyaline masses. Special stain. Everything but the elastic tissue and hyaline is decolorized. Photo magni. x 125.

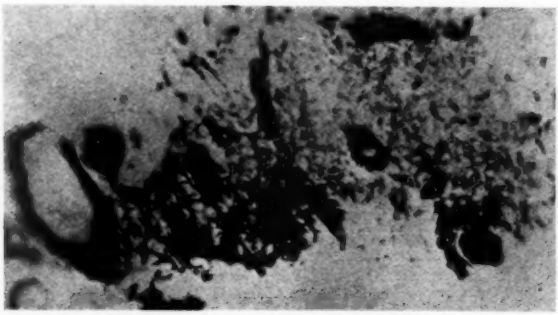

FIG. 4.—Reticulum of elastic tissue fusing into hyaline masses. Special stain. Everything but the elastic tissue and hyaline is decolorized. Photo magni. x 250.

and showed scars of an old trachomatous process. Small scars were present in the central part of the cornea of each eye. There was a pterygium of moderate size.

The conjunctiva of the right eye showed scars of an old trachoma, and the eyeball was normal except for corneal scars.

The Wassermann reaction was negative, and the nasal examination showed nothing of importance.

The patient was taken into the Hospital and the tear sac was removed. A piece of the growth on the tarsus of the left upper lid and the pterygium were excised.

On December 23d, the patient was discharged from the Hospital, and has not been seen since.[1]

Pathological Examination.—The material for examination consists of the entire lacrimal sac, a portion of the conjunctival growth, and the pterygium, with a small amount of bulbar conjunctiva. A piece of the conjunctival growth, transplanted to the denuded conjunctival surface of the lower lid of a Java monkey, healed in position, but was gradually absorbed. The remainder of the conjunctival growth was fixed in absolute alcohol. The lacrimal sac was bisected horizontally, one-half then being fixed in Zenker's fluid and the other in formalin. Part of the latter was prepared by Levaditi's method for spirochætes.

The lacrimal sac is practically intact, 16*mm* x 11*mm* x 8*mm* in size, and is firm and elastic in consistency. On section it is seen that its enlargement is not due to distention of its lumen, but to a relatively enormous thickening of its wall. At some levels it shows three lumina. Elsewhere these are found to unite into one. They have obviously resulted from infoldings of the thickened sac wall. The lumina are collapsed and free from secretion.

Microscopic Examination.—The epithelium of the lumina is normal. The thickening of the sac wall is found to be due chiefly to a marked increase in the adenoid layer, although the connective-tissue layers are also greatly increased in thickness (Fig. 1). The adenoid layer is separated from the epithelium by a thin layer of connective tissue, and consists of a reticulum of connective tissue densely packed almost exclusively with plasma cells. These cells stain typically in thionin, and when stained in phosphotungstic acid hæma-

[1] Since this was written the patient has been seen again (Feb. 10, 1915). No recurrence has taken place in the region of the lacrimal sac, but the conjunctival growth in the left eye has recurred and become still more extensive. Microscopic examination shows the identical process previously found. The conjunctiva of the other eye has also apparently become slightly affected.

toxylin each shows centrosomes in the clear space contiguous with the nucleus, as in the case of ordinary plasma cells. No distinctly differentiated nucleoli, such as are seen in the cells of multiple myelomata, occur, and no mitotic figures are found. Some of the plasma cells show colloid degeneration and other forms of degeneration commonly seen in chronic inflammatory processes. The most striking feature of the adenoid layer is an abundance of hyaline material within it occurring in small and large irregular masses, the largest being about 1.25*mm* in diameter. The hyaline takes the eosin stain, and stains intensely red by Van Gieson's method. It also stains red in Mallory's connective-tissue stain, which fact is sufficient to differentiate it from amyloid. (The cut surface of the fresh tissue does not give the amyloid reaction with either Lugol's solution or gentian violet.) The masses are none of them definitely calcified, but are evidently hard, as some of them have injured the edge of the microtome knife. Many of the masses are being attacked by foreign-body giant cells.

The smaller masses of hyaline, as well as some of the comparatively large ones, show definite relation to the blood-vessels (Fig. 2). They evidently represent arteries and capillaries which have become completely converted into hyaline, for all stages in the transformation can be seen. The arteries, both within the connective-tissue wall of the sac and within the adenoid layer, show extreme endarteritis, frequently with complete obliteration of the lumina. In fact, almost no normal arteries can be seen anywhere. The endarteritis is not always associated with the hyaline change, but the hyaline change is always associated with endarteritis of the affected vessel.

By a special method of staining, it is found that the hyaline is derived chiefly, if not solely, from elastic tissue. This fact is not evident after the usual methods of staining because the elastic tissue has lost its specific staining reactions. Thus, Verhoeff's elastic-tissue stain, as well as acid orcein, fail to stain any elastic tissue in the specimen even including that of the blood-vessels, except at the periphery of the capsule where the tissue is relatively normal. Here elastic fibers can be seen extending inward, but they quickly lose their distinctive color and take the eosin stain. By the following method, however, this altered elastic tissue is stained intensely and an unsuspected abundance of it revealed throughout the specimen. This method does not stain normal elastic tissue, but does stain elacin and other altered elastic tissue which stains slightly or not at all by the ordinary differential methods: Mallory's phosphotungstic acid hæmatoxylin 24 hours. Water. 1% aqueous solution

of potassium permanganate a few seconds. Water. 3% solution of oxalic acid until color of the permanganate is removed. In this way the altered elastic tissue and hyaline are stained deep blue-black, while all other tissue elements are decolorized. A beautiful contrast stain may be obtained by staining the sections in eosin before placing them in the hæmatoxylin solution. For this method Zenker's fixation is necessary.

In the case of the blood-vessels, it is found by this method that there is first great increase in the elastic tissue within and around the media. The elastic fibers then become thickened and fuse together, ultimately forming a more or less solid ring around the original lumen. At the same time, the intima has proliferated and finally obliterated the lumen. In some instances, this proliferated intima remains as a central core of hyaline connective tissue which is differentiated from the surrounding hyaline by its staining reactions. In other instances the intimal tissue also becomes pervaded by elastic fibers which undergo hyaline transformation so that the vessel is completely converted into a hyaline column. In the case of very small vessels and capillaries, the same process takes place and the lumina of these also become obliterated. As a preliminary to it, elastic tissue is formed around capillaries and small vessels which normally are without such coats.

The largest masses of hyaline do not represent transformation of blood-vessels, but nevertheless arise from elastic tissue. Some of the latter is evidently derived from the elastic tissue of the adventitia of large vessels that has proliferated into the surrounding tissue. Much of it, however, has extended into the adenoid layer from the connective-tissue capsule of the sac in which there is an enormous development of coarse, elastic fibers (Fig. 3). Within the adenoid layer the elastic tissue forms an irregular reticulum which shows all transitions from a very delicate to a very coarse structure, and shows transformation into hyaline in the same way as the elastic tissue of the arteries (Fig. 4). The Levaditi specimens show no spirochætes or other organisms in the tissue.

Conjunctival Growth.—The specimen removed from the palpebral conjunctiva shows the same pathological condition as the lacrimal sac; that is, marked increase in thickness of the adenoid layer due to infiltration with plasma cells, and large masses of hyaline. The latter are likewise derived from elastic tissue, the transition stages in its formation being easily made out as in the case of the lacrimal sac. After alcohol fixation, the hyaline stains blue in thionin, while the elastic tissue stains in eosin.

The piece of bulbar conjunctiva removed along with the pterygium is markedly infiltrated with plasma cells, but shows no hyaline. The pterygium itself is not infiltrated and shows nothing remarkable.

The pathological process present in this case is undoubtedly identical with that described in the literature as hyaline or amyloid degeneration of the conjunctiva, or plasmoma of the conjunctiva. The case, however, differs from all others reported in that the lacrimal sac was also involved—in fact, much more extensively than the conjunctiva.

In 1891, Unna (1) described the elements which he called plasma cells, believing them to correspond with certain granular connective-tissue cells to which Waldeyer had previously given the same name. These cells are now held to be closely related to lymphocytes. Unna directed attention to tumor-like collections of these cells, which he called plasmoma. His first observations were made in a case of lupus. In more recent times the same name has been given to similar tumors occurring in different parts of the body; notably, the Sinus Morgagni, uvula, gums, larynx, lung, and digestive tract. The term "plasmacytoma," which has also been used for these tumors, would seem to be preferable.

Pascheff (2) was the first to describe a plasmoma of the ocular structures as such, and published 4 of the 9 cases in which the eyeball or its appendages have been involved up to the present time. The writers' case is the 10th. The other cases are those of Rund (3), Deutschmann (4), Rados (5) [two], and Pokrowsky (6).

It is evident, however, that this condition does not form a pathological entity, but simply represents an early stage of the disease, known to previous writers as hyaline and amyloid degeneration of the conjunctiva, of which some 90 cases appear in the literature. The degenerated masses sometimes give the staining reactions of amyloid, sometimes of hyaline only, and sometimes the reactions are indefinite, so that it is impossible to draw any sharp distinction between the two types of degeneration.

Clinically, plasmoma cannot be distinguished from amyloid or hyaline degeneration; but Pascheff would distinguish it pathologically by the extraordinary development of plasma

cells in the former case, and from the fact that there is little or no degeneration of the connective-tissue cells.

Former writers—Raehlmann (7), Kubli (8), Kamocki (9), and Rumschewitsch (10)— in describing hyaline and amyloid degeneration, found adenoid hypertrophy in the early stages of the disease. In later times, this adenoid hypertrophy was recognized to be infiltration with plasma cells [Schieck (11), Del Monte (12)].

According to the preponderance of the cellular elements, or of the degenerative material, the condition has been termed plasmoma or hyaline (amyloid) degeneration.

It should again be emphasized that the pathological picture varies extraordinarily according to the stage in which the growth is removed. In one case it will be found to be composed almost entirely of plasma cells with little or no degeneration. In most cases, however, this early stage is soon followed by the deposition of large quantities of hyaline or amyloid so that the picture becomes a very different one.

The question of the origin of the degenerative material is not without interest, and has led to a number of different views. Von Recklinghausen (13), Raehlmann, and others believed that the degenerative products arise from the tissue cells; Leber (14), that the amyloid comes from the tissue cells and especially from the giant cells.

Saemisch (15), however, agrees in the view first expressed by von Hippel (16); namely, that the cells play only a passive rôle, and that the degeneration occurs in the vessel walls and in the intracellular tissue. This view is supported by Vossius (17), Rumschewitsch (10), and Kamocki (9).

According to Parsons (18), degenerative changes lead to the formation of homogeneous material, and in all probability these products come from exudates or secretions—that is, from the non-living products of living cells.

Ishihara (24) is of the opinion that we must assume at least two sources of origin. "The amyloid developed principally from plasma cells seems to be peculiar only to those tumors which are local, while the amyloid arising from the reticulum can form not only local tumors but also general amyloid degeneration."

It should be emphasized that amyloid and hyaline degenera-

tion of the conjunctiva represents a purely local condition, and is not associated with the well-known, general amyloid degeneration of wasting diseases.

From the evidence presented in the pathological examination of the case described by the writers, it is believed that hyaline material is derived from the elastic tissue, and that this transformation may be analogous to that which takes place in pinguecula or pterygium, in which there is also excessive proliferation of elastic tissue with degeneration into hyaline. That plasma cells are not directly concerned in the formation of the hyaline, is shown by the fact that the various stages of its transformation from elastic tissue could be observed in the media of large vessels in which there were no plasma cells.

References to hyaline and amyloid degeneration of the conjunctiva in the English and American literature comprise only two articles, those of Knapp, Alleman (19), and Herbert (20), and no case of plasmoma is to be found up to the present time.

Of the nine cases of ocular plasmoma which are on record, the conjunctiva of the lids and bulb was involved in eight; while in one, the cornea was the main seat of the growth. In one case, there was also an unmistakable hyaline degeneration of the lacrimal gland.

The only further reference to hyaline degeneration of the lacrimal apparatus is to be found in a monograph by Marongiu (21) on *Trachoma of the Tear Passages*. In certain instances many plasma cells were noted under the epithelium in the papillæ in the neighborhood of the vessels. These cells degenerate and give rise to Russell's bodies. This, however, is apparently only the hyaline degeneration seen in trachoma or in any chronic inflammation, and is evidently not to be confounded with the massive degeneration with which we are concerned in this paper.

A more extended reference to the cases of plasmoma which have already been described will be found at the end of the paper.

The clinical picture of the conjunctival disease is uniform, varying only in details, and as Deutschmann well states, the same picture is common to the three conditions—plasmoma, hyaline degeneration, and amyloid degeneration. The process

begins with a painless and non-inflammatory enlargement of the lids, more often in the upper. As this increase in size takes place, the lid stands out more and more from the eyeball and droops more and more until the edge may overhang that of the lower lid. The skin of the lids is usually unchanged in character, but rarely shows a brownish pigmentation toward the lid margin. Eversion of the lid shows the enlargement to be due to an enormous thickening of the conjunctiva, most often in the fornix, and in this region may be seen long, sausage-like tumors forming folds and coxcomb-like excrescences. Or the growth may affect the tarsal conjunctiva, the bulbar conjunctiva, the semilunar fold, the caruncle; rarely, as in Pascheff's case, the cornea, and in the writers' case, the lacrimal sac.

The surface of the conjunctiva is ordinarily smooth, and varies in color, according to the stage of the growth, from a bright red to a pale yellowish-gray or even like wax. Occasionally, the surface may be mottled with bright yellowish areas intermixed with the red.

The firmness of the structure varies according to the amount of degeneration. It may bleed readily on manipulation, or if degeneration is far advanced it may show a noticeable avascular character. Both lids are often affected, and both eyes in perhaps one-third of the cases. The disease is found most often in the third decade, but the variations are wide.

Trachoma coexists in perhaps one-third of the cases of plasmoma, hyaline and amyloid degeneration; but, in the opinion of the best authorities, there is no direct relationship between the two.

From the standpoint of differential diagnosis, it should be remembered that a coexisting trachoma may so distort the clinical picture as to make its recognition somewhat difficult. Furthermore, as Saemisch notes, certain tumors—notably, leucosarcoma of the conjunctiva and symmetrical lymphomata of the orbits—might be mistaken for this disease. In any case, microscopic examination of an excised piece of the growth should make the diagnosis clear.

The prognosis is, on the whole, good. The process is a very slow one, and may often be checked by excision. In those cases where the growth is too extensive for total removal, a partial excision has led to the spontaneous disappearance of the

remainder. Recurrences are frequent, so that a number of operations may be necessary.

In regard to plasmoma of the lacrimal sac, the clinical diagnosis, judging by the writers' case, should not be impossible. The great thickening of the sac, its waxy consistency, and its lack of cystic distention would seem to be sufficiently distinctive. If in addition there was, as in the writers' case, plasmoma of the conjunctiva, the diagnosis could be considered certain.

Is this new growth to be reckoned among the chronic inflammations, or does it really represent a true tumor? On this point opinion is divided. Pascheff inclines toward the view that we are dealing with a chronic inflammatory process, and in support of this cites the presence of polynuclear leucocytes, especially in the second case which he described, and the inflammatory condition of the conjunctiva in three of his cases, and of the cornea in two (Pascheff's first article, p. 123).

Boit (22), who described a plasmacytoma of the Sinus Morgagni, inclined to the view that it was a true tumor, and in support cited the uniformity of the cell picture, the richness in cells, the multiplicity of the nuclei and the partial degeneration. On the other hand, Pironne (23), who described a similar growth arising from the gums, was in favor of a chronic inflammatory origin.

Rund believes Pascheff's classification to be incorrect, since inflammatory changes are not unknown in the neighborhood of true tumors. Polymorphonuclear leucocytes were only present in small numbers and in areas of degeneration, a feature also common to true new growths. Sections in Rund's case showed in many places the structural picture of a sarcoma, with the exception that the elements were plasma cells. A careful examination of the relation of the tumor masses to the immediately underlying tissue led him also to the same conclusion. He places his case in the group of aleukemic heteroplastic lymphomata.

Deutschmann found in his case nothing that spoke for a chronic inflammatory origin. The leucocytes in the epithelial involutions he took to represent conjunctival secretion. There was no hypertrophy of the subconjunctival tissue, and therefore the growth represented a true tumor, best described by the term plasmoma.

Rados, though confronted by the same clinical and pathological findings, interprets them to be of a chronic inflammatory origin.

In the writers' opinion, the evidence at hand points to an inflammatory origin for the condition. The clinical fact that it has occurred frequently in conjunctivæ showing evidences of existing or previous trachoma points in this direction. It seems to the writers that trachoma is far too infrequent for its coexistence in one-third of the cases of plasmoma to be mere coincidence despite the evidence to the contrary previously quoted. Moreover, infiltrations consisting almost exclusively of plasma cells are characteristic of chronic inflammatory processes of slight intensity, notably late syphilitic lesions. As another illustration of this fact, brawny scleritis may be mentioned. On the other hand, there is a we l defined class of true tumors made up of plasma cells, namely the multiple myelomata. These tumors, however, do not show the hyaline degeneration or the vascular changes seen in the so-called plasmomata, and their cells show definite nucleoli and occasionally mitoses, whereas the cells of plasmomata show neither.

Granting that the plasmoma is an inflammatory growth, the difficulty remains of finding its cause. That it is due to the presence of organisms within the tissue is unlikely from the character of the lesions. Plasma cells, it is true, frequently occur in connection with lesions due to micro-organisms, but they are then usually associated with other cells, most often focal collections of pus cells or endothelial cells. It is conceivable, inasmuch as we know nothing definite of the organism causing trachoma, that the condition may be due to the presence of this germ, although the absence of trachoma follicles in the affected tissues is against this view. A possible explanation, also, is that the condition is due to the slow absorption of a toxin from the conjunctival sac. Such a toxin might result from the diseased condition of the conjunctiva dependent upon the old trachoma or other chronic inflammatory process. Acting over a long period of time it might well induce the plasma-cell infiltration, the excessive production of elastic tissue, and the degeneration of the latter into hyaline. In addition it might act on the blood-vessels, thus causing the marked endarteritis. The apparent localized character of the

growths would seem to be somewhat against this hypothesis, but as a matter of fact the condition may not be strictly local since in the present case an excised piece of the bulbar conjunctiva also showed well marked plasma-cell infiltration.

SUMMARY OF PREVIOUSLY REPORTED CASES OF PLASMOMA OF THE CONJUNCTIVA.

CASE 1. (Pascheff).—A 28-year-old peasant with no previous eye disease. For three or four years he had noticed a heaviness of the right upper lid. The lid hung so low that it partially covered the lower lid. The margin was thickened. A growth 4*mm* thick covered the tarsus, decreasing toward the fornix. The surface of the conjunctiva was smooth and of a pale red color. The consistency was soft, and it bled freely when cut. No apparent trachoma. The lower lid was injected and slightly thickened. The eyeball was normal. The left eye showed a conjunctivitis. A portion of the growth was excised.

CASE 2. (Pascheff).—Peasant. 50 years old. One and one-half years previously the eyes became inflamed. The right eye got well, but the left eye remained red and the upper lid thickened so that he had great trouble in opening the eye.

The right eye showed a chronic trachoma in the cicatricial stage.

The left upper lid was thickened and covered the border of the lower lid. On everting it, a localized hard thickening at the inner half was found, the surface of which was smooth and of a wine-red color. The tarsal conjunctiva of the lower lid showed one localized thickening. In the fornices, especially the upper, appeared a greatly thickened conjunctiva, forming sausage-like tumors, of a deep to a pale red color, and a smooth surface. The upper bulbar conjunctiva was thickened, and folds of it largely covered the cornea. No trachomatous granulations. The surface of the cornea showed slight ulcerations. The thickened conjunctiva was removed by operation.

CASE 3. (Pascheff).—A peasant girl, 16 years old, gave a history of ocular inflammation at the age of six and a partial loss of sight. At 14 years of age, a second inflammation took place, and the left eye became blind. Beginning then a tumor developed at the upper border of the right cornea, which in two years largely covered it.

The right upper lid was pushed forward, and its conjunctiva and that of the lower lid showed numerous trachomatous granulations. The upper $\frac{3}{4}$ of the cornea was covered by a large tumor, of well defined outlines, and soft, deep

red, smooth irregular surface, bleeding easily. The inner half of the tumor reached a thickness of 6 to 8*mm*. The lower ⅕ of the cornea was vascularized, so that the iris could not be seen. Vision = light perception.

The left cornea showed an ectatic adherent leucoma, and in the fornices were many trachomatous granulations.

The tumor of the right cornea was removed, and an optical iridectomy performed. The vision then rose to the counting of fingers at 50*cm*.

CASE 4. (Pascheff).—Peasant girl, 8 years old, of weak constitution. For 2½ years, eye has been red and watery and the lids stuck in the morning. She was never treated.

The right eye showed a moderate ptosis, and the lid borders were red. The conjunctiva of the lower lid was thickened and of a rosy wine color. The thickening was mostly regular, but showed a few more marked areas. The thickened area stretched from the fornix to somewhat over the lower bulbar conjunctiva to the plica semilunaris. The greatest degree, however, was in the upper fornix, where it formed a fleshy, sausage-like tumor.

In the left eye a similar sausage-like tumor appeared in the lower fornix. The upper fornix was less thickened. There was apparently no trachoma.

CASE 5. (Rund).—A 51-year-old male had for seventeen years a tumor of the conjunctiva of the left upper lid. Fifteen years ago it was excised and recurred. Five years ago it was excised again and recurred, so that now there existed a tumor of the size of a hazelnut. The well-outlined tumor sat on the inner part of the conjunctival tarsi of the left upper lid, and seemed to merge into the caruncle. Upward it reached the fornix, and downward it went slightly beyond the lid margin. The lid stood out ½ to ¾*cm* from the eyeball. The tumor was 2½*cm* long by 1*cm* wide, red in color, and rather hard. The surface was fissured, and it bled freely when disturbed. The eyes were otherwise normal. Tumor removed.

CASE 6. (F. Deutschmann).—The patient was 21 years old. There was slight watering of the left eye, with swelling of the lower lid for three months. The left upper lid stood out from the eyeball. On everting it, the conjunctiva was found to be swollen to a thickness of 5*mm*. The surface was smooth, without scars and of a yellowish-red color. The thickening could not be moved over the tarsus. It extended to both commissures, but did not involve the fornix. The tumor was removed easily from the tarsus, and measured 20*cm* long, 12*cm* wide, and 5*cm* thick.

CASE 7 (Rados).—A 54-year-old woman complained for six years of lacrimation and irritated eyes. The con-

junctiva in each eye was injected to a deep red color and showed marked hypertrophy. The conjunctival tarsi showed marked scarring in places. The left fornix was so thickened that one could speak of tumor formation. The tarsus of the left upper lid was about *1cm* thick. In the right fornix were coxcomb-like excrescences. Both corneæ showed a thick superficial pannus. The tumor was extirpated.

CASE 8 (Rados).—Woman, 48 years old. In the right fold of transition was a somewhat lobulated tumor connected with the tarsus, which had enlarged for 1½ years and pushed the upper lid well forward. It was rather soft and of a bright red color. The conjunctiva and cornea of both eyes were otherwise normal. The tumor was extirpated with the tarsus.

CASE 9.—At the December 20, 1911, meeting of the Moscow Ophthalmological Society, Pokrowsky demonstrated a conjunctival plasmoma.

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ACUTE (BACILLUS TULARENSE) CONJUNCTIVITIS.[1]

By Dr. ROBERT SATTLER, Cincinnati, Ohio.

THIS brief description adds another to a rare and hitherto unknown and unclassified ocular lesion for which recent research work [Wherry(1)] enables us to assume a definite bacteriologic origin.

The patient was a woman of strong and robust appearance, 43 years old, born and residing in Ohio County, Indiana. She had been in good general health and this was her first ocular disturbance. Without assignable cause and within a time period of less than twenty-four hours preceding her visit to me, her left eye became irritable, attended by excessive weeping. Aside from a steadily increasing feeling of stiffness and burning of the eyelids, due to the œdema, there was no pain. At the same time she was nervous and excitable, and, contrary to her wont, she became loquacious, restless, and at times mildly delirious and complained of hot flashes preceded by rigors, intense thirst, and transitory neuritic (?) pains in her left thigh and leg. She also noticed from the very first a marked swelling occupying the front

[1] In certain sections of Ohio, Kentucky, and Indiana, along the Ohio River, rabbits and other rodents are known to have died from a supposed plague-like disease, strongly pointing to a similar infectious lesion, discovered and described by McCoy and Chapin, among the ground squirrels in Tulare County, Cal.

The patient admitted having, with other members of her family, partaken of rabbit meat which she had prepared for the table. The animals were shot or killed in the vicinity of her home. She also admitted that walking with her dog on her own farm, the latter killed and ate a rabbit which showed signs of feebleness. She did not handle this rabbit and no ill consequences attended the killing and eating of the rabbit by the dog.

How the ocular contagion or infection occurred in this case remains a speculative assumption only.

of the left ear, which was very tender and which rapidly extended to the left side of the lower jaw and neck.

Her physician, Dr. Hall, recognized at once from the acute onset and the uncommon constitutional disturbances the grave character of the ocular lesion and without delay sought counsel.

We found her left eye alone affected. The œdema of the upper lid was tense and glossy, but eversion of the lid was possible and afforded us a complete and careful inspection of the conjunctiva. The bulbar division was slightly chemotic, that of the lid and fornix swollen and dusky in appearance and traversed by thin, translucent, corrugated, sausage-like tubes or lines. The cornea was clear and its epithelium smooth. There was no implication of the uveal tract. Irregularly scattered in the dusky and swollen conjunctiva of the upper and lower lids and fornices, we discovered seven distinct points of infiltration about the size of a split pea resembling pustules which had ruptured and had been converted into shallow ulcers. Each infiltration area was distinctly circumscribed by a grayish-white line and a less saturated base. Four were in the upper lid and three in the mucous lining of the lower lid; two were well concealed in the dense and swollen folds of the upper and lower fornix. None were discovered on the ocular or bulbar conjunctiva. The discharge was watery and straw-colored, with a profuse admixture of stringy and rapidly desiccating mucus if it became entangled or adhered to the shafts of the eyelashes or accumulated at the inner and outer canthus. We could discover no ecchymoses, nor rigid infiltration or longitudinal folding of the palpebral conjunctiva. The local appearance here suggested an intense and increasing œdema, both on the part of the lid and bulbar conjunctiva, accompanied by a marked venous and, in particular, a lymph stasis. She answered incoherently and complained of pain principally in the swollen region in front of the left ear, face, and neck. Temperature 104°.

The following day the constitutional symptoms were intensified. The eyelids were tense and glossy. In appearance the face and neck resembled and strongly suggested acute erysipelas as excessive prostration, profuse perspiration, continued high temperature, and delirium were present. More searching palpation led to the discovery that in addition to the diffuse and clearly outlined cutaneous swelling there was a glandular enlargement with its most marked expression in one of the preauricular glands, from which larger and smaller ones could be traced to the submaxillary and neck region and also to similarly indurated lymph nodes along the inferior margin of the orbit, to the inner canthus.

Repeated attempts to discover organisms in smears, from scrapings of the conjunctiva and the discharge, were unsuccessful. The œdema of the eyelids prevented a close or searching inspection of the eye; the discharge was not profuse and at no time subsequently distinctly purulent, but a constant although moderate flow of straw-colored watery mucus persisted. The right eye was inspected, found apparently intact, and hermetically sealed. For a period of five weeks amidst constitutional symptoms, which alone suggested septic infection,—persistent high and fluctuating temperature; excessive prostration; profuse sweating; recurring chills; delirium; attended by increase and diminution of the glandular swellings of the left side of the face and eyelids continued. The swelling of the neck at times assumed such proportions that interference of respiration was added. She made a slow recovery with complete subsidence of constitutional disturbances. The disappearance of the ocular symptoms even preceded the latter and was marked by a return to normal conditions and appearances, except on the part of the ocular conjunctiva. Here a distinct lymph ectasia or caseated node in the course of a dilated and translucent lymph channel persisted, but gave rise to little or no discomfort and no local irritation; but owing to its barley-grain size and yellowish appearance was objectionable because of its unsightliness and the more than probable certainty that the incarcerated infectious material and resident virulent organisms might light up a local or general disturbance. At a supposedly opportune time, with every surgical precaution, this node was excised. Half was transferred by Mr. Lamb to a guinea-pig and the other half utilized for microscopic examination. The truly remarkable happening following this minor surgical intervention was an immediate reënactment of the same local and constitutional symptoms which had so satisfactorily and completely disappeared. On the part of the eye, intense irritability with rapid and excessive œdema of the lids, chemosis of the ocular and swelling of the palpebral conjunctiva without pustular formations, with rapid enlargement and pain of the lymph nodes along the lower orbital margin, and even more marked and painful enlargement of the much-reduced lymphatic nodes of the anterior auricular, face, and neck regions came about. Intense rheumatoid pains in the back, thighs, and ankles and high temperature. We had within twelve hours a return of the complete original clinical picture, with the same though lesser mental depression, milder delirium, but intense prostration. Within a time period of two weeks complete subsidence with restoration of function and appearance of the eye have come

about, but with persisting, though diminished, glandular swellings of the regions repeatedly referred to.

In some particulars the present report departs from, in others it adds to, the clinical history and probable etiology of the case reported by Dr. Vail (2), which was subsequently admitted during my service at the Cincinnati Hospital. His case afforded us an opportunity to study, in particular, the declining stage of the ocular œdema and lymph stases and also gave us a better understanding of the circumorbital lymph nodes and their persistent enlargement after the subsidence of the acute œdema and the choking of the lymph channels of the conjunctiva had disappeared. In Dr. Vail's case, at the time the patient entered the ward of the Cincinnati Hospital, three weeks after the acute onset, the most conspicuous symptoms were three shallow infiltrated, almost circular grayish-white spots, two concealed in the depths of the lower fornix, with even a more striking clinical feature, a larger nodular flattened lymph node in addition to those of the pre-auricular submaxillary glands which occupied the region of the tear sac.

To Dr. Wherry and his assistant Mr. Lamb we are certainly much indebted for having established the bacteriologic origin and in this case, to have pointed out to us the organism of a rare ocular lesion, and for having added one more to the small number of eye lesions which have a known and accepted bacteriology.

Bacteriologic findings (W. B. Wherry and B. H. Lamb, Laboratory of Cincinnati Hospital):

On October 9, 1914, some of the secretion from the eye was suspended in 0.85 per cent. sodium chloride solution and injected intraperitoneally into a guinea-pig. This animal died six days later and on dissection showed lesions resembling those by *B. tularense, i.e.*, marked congestion of all the internal organs but especially of the spleen and liver, which were riddled with small yellowish-white foci of necrosis. Smears from the spleen and liver stained with aniline Hoffmann's violet showed numerous minute encapsulated coccoids and rods resembling *B. tularense.* Cultures from the spleen were made on + 1 nutrient agar, glucose agar, glycerine agar, and human blood agar, and on coagulated hen's egg yolk. No growth appeared

on any media during sixteen days' observation excepting the egg yolk. Here there was, within twenty-four to forty-eight hours, a slimy, sticky growth. On microscopic examination this showed chiefly coccoid bodies along with a number of rods.

Subcultures failed to grow on a variety of ordinary media, but always grew well on coagulated hen's egg yolk.

We may note here that we were able to demonstrate this strain of the virus with greater ease than the first strain. It stained, in tissue smears, rather readily with Loeffler's methylene blue, whereas we were never able to demonstrate the first strain with this dye. However, both these strains take up aniline dyes rather poorly.

A small quantity of the egg-yolk culture obtained from the above guinea-pig was rubbed into a needle prick in the left conjunctiva of a full-grown rabbit. In forty-eight hours the left eye showed marked œdema and a copious purulent discharge which, when stained with Hoffmann's violet, showed minute coccoid bodies and a few rods. The animal died on the fifth day. On dissection, many discrete yellowish-white ulcers were found on both tarsal conjunctivæ, the left cervical glands were enlarged and hard, and the spleen and liver were enlarged, congested, and full of numerous foci of necrosis.

Examination of the small glandular node removed from near the left canthus:

This was removed on November 18th and a few minutes later half of it was ground up with 0.85 per cent. sodium chloride solution and injected intraperitoneally into a guinea-pig. This animal remained alive and well for nearly a month when it was chloroformed and dissected and found normal.

The other half of the gland was fixed and sectioned. Dr. P. G. Woolley reports that microscopically it appears to be a granuloma without giant cells apparently occurring in a lymph gland.

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CONCERNING REMOVAL OF THE EYEBALL.

III.

CILIARY GANGLION ANÆSTHESIA.

By HARRY S. GRADLE, M.D., Chicago.

THE third phase of this subject deals with the anæsthesia necessary for the removal of the eyeball. Formerly general anæsthesia, ether or chloroform, was used exclusively, and to this day, the majority of operators, in this country at least, continue that practice.

After the introduction of cocaine into ophthalmology, various operators enucleated the eyeball under anæsthesia produced by the simple instillation of a 4% solution of the drug into the conjunctival sac. Later, injections of 2% or 4% cocaine were made into or along the four recti muscles, following the usual cocaine instillation. But enucleation under this anæsthetic was very painful.

In 1907, Siegrist (5) published a method of local anæsthesia. After cocaine instillations, he injected cocaine or novocaine with adrenaline along the course of the four recti muscles rather deeply into the orbit. A final injection of a small amount of the fluid was made into the region of the ciliary ganglion. After a wait of about three minutes, he proceeded with the operation. Mende (6) reported 155 cases operated upon in the Siegrist Clinic by this method. Of this number, 119 were painless, 28 slightly painful, and 8 very painful. The eyes that were not irritated seemed less susceptible to the influence of the anæsthetic than were those that were more or less congested. The author spoke of three contraindications to the use of this anæsthesia: (1) in collapsed eyes; (2) in

hypersensitive individuals or children; and (3) in ruptured panophthalmitis. Occasionally there followed some vomiting or a slight collapse, probably due to cocaine idiosyncrasy. A somewhat similar method of anæsthesia was published by Seidel (7), as well as by Bruns (8) and Robin (9).

In 1905, Elschnig (1) first advocated anæsthesia of the eyeball by injection of cocaine into the region of the ciliary nerves on their way through Tenon's capsule. This is a true local anæsthesia. The same author in 1908 published the technique of an anæsthesia on the "nerve-block" principle. This consisted in the injection of cocaine into the ciliary ganglion and the III. nerves as they enter the orbit. The anatomical course of the injection was fully shown by Lōwenstein (2). The method has been described in this country in an article by Vail (3) and in another by Wyler (4).

This report includes 236 cases of removal of the eyeball for one cause or another as noted in the preceding two articles. Of this number, 146 eyes were enucleated or exenterated under ciliary ganglion anæsthesia, while a general anæsthetic was employed in 90 cases. As a rule, in extremely young or very sensitive individuals, ether or chloroform was given, not only to avoid shock to the patient, but also to spare the operator 125 of the 146 ganglion anæsthetics, or 85.6%, were successful in that the patients experienced but a minimum of pain. Thirteen individuals, comprising 8.9% of the total, complained of moderate pain during the course of the operation, but were able to allow the operator to proceed without interruption. It was necessary to interrupt the course of the operation and deliver a general anæsthetic in only eight cases, or 5.5%.

The indications for the use of ciliary ganglion anæsthesia are very liberal, in that there are only three contraindications. It is scarcely necessary to mention that this technique may be indulged in only when the eyeball is to be enucleated or exenterated. For there is sufficient damage to the optic nerve and other intraorbital tissues during the course of the injection to contraindicate its use when vision is to be preserved. In very young individuals, it is sometimes unavailable because of the natural restlessness of the patient. But I have seen a child of three years lie perfectly quiet without a whimper while the eye was removed under ciliary ganglion anæsthesia alone. A

high degree of neurasthenia is frequently a contraindication to its use. Intraocular tumor, even when a fairly high degree of vision still remains, is not a contraindication to local anæsthesia. It has been claimed that an intense mental shock will result from the sudden loss of vision, but among the cases reported herein were ten such operations without more than the usual shock. Furthermore, such eyes are far better enucleated under local anæsthesia, thereby preventing the possibility of operating upon the sound eye. Such an occurrence has been recorded [Czermak–Elschnig (10)]. It is safer to use other anæsthetics in ruptured panophthalmitis, because of the danger of driving infectious material farther into the orbit. In all other conditions, the local anæsthetic is far preferable to the general.

As the technique is not generally known in this country, a short description will not be out of place. After complete anæsthesia of the conjunctiva by instillations of cocaine, the needle, exactly 5*cm* in length, is introduced underneath the conjunctiva at the outer canthus slightly above the median line along the upper border of the external rectus. It lies horizontally and is directed backward so that a backward prolongation of the needle would form an angle of about 20° with the anteroposterior axis of the eye. This direction is maintained until the equator of the bulb has been passed. During the entire procedure, a small amount of fluid should be injected in advance of the needle in order to lessen the pain and also to anæsthetize the optic nerve sheaths by pressure. The needle is then turned sharply inward, still in the same plane, forming an angle with the backward prolongation of the anteroposterior axis of about 40°. From here on there is no change in the direction of the needle and it is pushed into the orbit until the tip touches the inner orbital wall, above the optic nerve. The hilt of the needle should be almost in contact with the conjunctiva and then the tip is in the neighborhood of the ciliary ganglion. It is obviously impossible to strike the ganglion itself as this is only about one millimeter in diameter. Consequently, the injection (from 1–2*cc*) is made into the region of the ganglion.

The best fluid for injection has proven to be a 1% solution of novocaine to which a small amount of adrenaline has been

added. 2*cc* of this mixture should be injected, in the case of the ordinary adult. This large amount of fluid serves a double purpose. Not only is the actual fluid more apt to come into contact with the ganglion, should this lie in an anomalous position, but a moderate degree of pressure, or œdema, anæsthesia results from the excessive injection. Cocaine cannot be used in such quantities because of its more toxic character.

About five minutes must be allowed to elapse before beginning the operation. During this time, an injection of cocaine or novocaine should be made under the conjunctiva covering the lower third of the bulb. This area is not associated with the ciliary ganglion, but is under the influence of the middle branches of the trifacial nerve and hence requires a separate anæsthesia. If a proper infiltration of the ganglion region has been secured and sufficient time allowed to elapse before beginning, the operation should be entirely painless. At times a momentary pain is felt by the patient, however, upon section of the optic nerve. This is probably due to the sensory fibers in the dura mater alone. Never have I been able to elicit a sensation of light, even in highly intelligent patients, although some have complained of a feeling as though "struck on the back of the head." It is advisable in old patients or those of an excitable nature to precede the operation by an injection of morphine or pantopon.

In 13 of the 146 cases, the anæsthesia was only fair, while in 8 the anæsthetic was a failure and general narcosis had to be resorted to. Under the class of fair anæsthetics were: Ablatio Retinæ, 1; Leucoma Adherens, 1; Tumor Choroideæ, 3; Vulnus Perforans, 4; Iridocyclitis Infecta, 2; and Ulcus Corneæ, 2. The latter class was comprised of: Vulnus Perforans; Iridocyclitis; Glaucoma Absolutum; and Atrophia Dolorosa. In other words, moderately inflamed eyes or eyes suffering from a non-inflammatory condition do not seem to respond to ganglion anæsthesia as perfectly as do highly inflamed bulbs. In two cases, there occurred a moderate protrusion of the eyeball, but the anæsthesia was perfect and the operation was not interfered with by the condition.

In conclusion, it might not be amiss to repeat the results of the study of these 236 cases.

1. Evisceration may be performed in all cases except those of

malignant growth and phthisis bulbi, provided care be taken that no choroidal remnants remain adherent to the scleral capsule. On the other hand, enucleation may be performed in all cases with the possible exception of very virulent panophthalmitis. From an economic standpoint, enucleation is to be preferred, when possible; but from a cosmetic viewpoint, evisceration is the operation of choice.

II. It is advisable to endeavor to implant human fat into Tenon's capsule or into the scleral capsule in every case of removal of the eyeball by enucleation or evisceration, except in the presence of acute infection of the coats of the eye.

III. Anæsthesia of the eyeball for purposes of removal is best obtained by injection into the neighborhood of the ciliary ganglion. It forms a safe anæsthetic that does not interfere with the operator. It is without danger to the patients and is contraindicated only in those individuals liable to intense mental shock.

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CHANGES IN THE BLOOD AND AQUEOUS HUMOR IN METHYL ALCOHOL INHALATION.[1]

By Dr. H. H. TYSON and Dr. M. J. SCHOENBERG, New York.

NOTWITHSTANDING the earnest efforts of the ophthalmologists, and the various committees for the prevention of blindness, to disseminate the knowledge of the poisonous qualities and effects of methyl alcohol, it is still a lamentable fact that many members of the medical and legal professions and the vast majority of the laymen, especially the workers using it, are either ignorant of or do not acknowledge the truth. The effect on the eyes and general health from drinking wood alcohol has been proven experimentally in animals, and has been corroborated in clinical practice; but the effect from its inhalation alone on the eyes has never heretofore been demonstrated experimentally.

Although much clinical data has been collected tending to show an effect similar to the one obtained from its imbibition, many doubt and some dispute its power to affect the human organism deleteriously through inhalation alone. The wish to prove this fact, coupled with a desire in the interest of humanity to lessen the number of the blind and to conserve life, induced us to undertake these experiments.

Without giving them in detail, it may be of interest briefly to refer to the importance of the subject to the body politic.

We have found that there have been about one hundred cases of amblyopia and death from inhalation of wood alcohol recorded in the literature to 1912, and we are of the opinion that this constitutes a very small percentage of the total

[1] Read before the Section on Ophthalmology of the New York Academy of Medicine, May, 1914.

number of cases which have actually occurred, as a great many either have not been recorded, or have gone unrecognized. Of those that have appeared in the literature, the question whether inhalation alone produced the condition has usually arisen. In conducting our investigations, we have endeavored to exclude all possibility of the entrance of the wood alcohol into the system except by inhalation, and we feel sure that we have succeeded in producing amblyopia and death in that manner, as we contemplated at the beginning of these researches.

In 1880 about 400,000 gallons of wood alcohol were manufactured, while in 1910 the amount had increased to over 8,000,000 gallons; consequently it appears that the industry has become firmly established. That being true, it is for the chemists and medical profession so to arrange for its use or composition that, while it may serve its purpose in the arts and industries, it shall not levy too heavy a toll on the artisans, and indirectly on the state by causing blindness or death. Its use is extensive; about 2,500,000 people working in trades are using it in the United States alone, and as the foregoing figures indicate, its use is increasing annually.

According to the 1904 United States Census, the following industries and trades were using wood alcohol:

Painters, glaziers, and varnishers	278,000	workers
Launderers	386,000	"
Boot and shoe makers	208,000	"
Barbers	131,116	"
Printers and lithographers	155,000	"
Wood-workers—piano, furniture, etc.	112,000	"

And about 500,000 workers divided among dye-workers, operators, brass-workers, cabinet-workers, gold and silver workers, harness-makers, hat-makers and tanners, metal-workers, photographers, bookbinders, chemists, etc.

The subject is one of increasing importance on account of the new employers' liability law in New York and other States. At present it is not even mentioned specifically as a hazard, but when the importance of the effect of its inhalation is realized, cognizance of this omission must surely follow.

The manufacturers assert that even admitting that commercial wood alcohol is poisonous, the refined product known

as Columbian Spirits is not. We have proved conclusively that the refined spirit is quite as dangerous as the unrefined; and indirectly more likely to destroy vision and life on account of the absence of the disagreeable odor to warn one of its presence.

The apparatus used in our investigations consisted of a wooden box which was 32*cm* wide, 47*cm* long, and 63*cm* deep (high) with an opening on each end about 1*cm* in diameter. In one end a mica valve was very delicately adjusted, allowing air to pass out. At the other end was an attachment for tubing which could be connected with an air-tank, or copper coil, and which acted as an inlet for fresh air. The top, in which were two square glass windows, could be fastened down by eight thumbscrews. The temperature of the air in the box for the experiments averaged about 68° F., while the hygrometric readings indicated an average of about 60 per cent., thus to a certain extent constituting conditions similar to those in which some of the workers with methyl alcohol use it, for example, varnishers in beer vats, etc.

The experiments were made with guinea-pigs, rabbits, dogs, and a monkey and consisted in keeping them in the box previously described or in a bell jar containing a definite quantity of the vapor of commercial or refined methyl alcohol, for various periods of time, watching them during the exposure, and examining them afterward. Some animals were kept in a closed space, others had free ventilation, and still others had forced ventilation by having fresh air pumped into the container. One group of animals were exposed only once for a relatively long period of time (three to six hours). Another group had a number of short exposures not exceeding one to two hours daily. By this plan we endeavored to reproduce every possible condition under which 2,500,000 human beings in the United States are performing their work in various trades, etc., in which methyl alcohol is used. One prolonged exposure to the inhalation of the vapor of the methyl alcohol without free ventilation invariably produced loss of consciousness, loss of pupillary reflex, slight contraction of pupils, marked ocular hypotension, coma, and death. A similar exposure to the inhalation of methyl alcohol vapor with active ventilation produced no such marked effect.

Repeated daily inhalations of the vapor for a limited time produced a reduction in visual acuity, and a marked reduction in general vitality. The injurious effect upon the eyes and general health was proportionate to the amount of methyl alcohol used, the humidity and temperature of the air, and the length of exposure and the species of animal. The last factor being important, the susceptibility increasing with the higher development of the animal species of the group of animals used by us, the monkey proved to have the greatest susceptibility to its deleterious effects.

While the data collected as a result of these investigations embraced the effect produced on all viscera, organs, and fluids of the body, it is our desire in this short paper to briefly summarize our observations upon the effect of the inhalation of the vapor of methyl alcohol upon the blood, and aqueous humor of the eye.

Blood count in dog with acute poisoning by inhalation of methyl alcohol. Before inhalation:

Erythrocytes	5,700,000
Leucocytes	11,800
Hæmoglobin	90 per cent.
Polymorphonucl.	79 " "
Lymphocytes	21 " "

After inhalation (2½ hours):

Erythrocytes	7,800,000
Leucocytes	28,600
Hæmoglobin	100 per cent.
Polymorphonucl.	99 " "
Lymphocytes	1 " "

The foregoing table is self-explanatory, showing an increase in all elements except lymphocytes, which show a decided decrease.

The electro-conductivity of the blood serum as determined by Edelmann's Universal Widerstandsbrücke (see technic, *Centralbl. f. Elektric*, 1887, p. 115) was increased after the inhalation of methyl alcohol vapor, the increase being produced either by a change in the corpuscles, from an increase in the H.-ion content, or from any increase in the inorganic salts. An increase in the H.-ion content will produce an increase in the acidity of the blood and also conduces to an

œdema of the tissues. As we found evidence of an acidosis in the blood, and a tendency to œdema of the ocular tissues, we think that the increase in the electro-conductivity was due to an increase in the H.-ion content of the blood. The chemical reaction of the blood serum, using phenolphthalein as an indicator, was found after inhalation of the vapor of methyl alcohol to be acid. The specific gravity and viscosity of the blood were increased while the coagulation time was diminished. As regards viscosity, there appeared to be a very slight difference in the reactions between the commercial and refined wood alcohol, the commercial apparently producing a relatively slightly greater viscosity. The increased viscosity and acidosis we consider play an important rôle in the causation of the symptoms produced by poisoning with methyl alcohol.

The examination of the aqueous at first we found rather difficult, as we attempted to obtain it from recently enucleated eyes and it was invariably mixed with blood. A later procedure whereby we aspirated the aqueous humor with a hypodermic syringe proved satisfactory. The aqueous is normally neutral, using phenolphthalein as an indicator. Tested after an animal had been exposed to the inhalation of the vapor of methyl alcohol, we found its reaction to be acid; and to our surprise relatively more so than the blood serum. But upon investigating the cause therefor it was readily explained by the fact that the serum contains cellular elements which possess the power to counteract and regulate to a marked degree any attempt on the part of a foreign element to change the normal alkalinity of the blood, while the aqueous is poor in cells which possess this power.

The results of our experiments with the titration method agree with the conclusions formed by Gregnolo (*Klin. Monatsbl. f. Augenh.*, 1913, p. 157), who determined after the *ingestion* of methyl alcohol that there was an increase in the concentration of H.-ions in the aqueous and serum, and who stated that these changes go parallel with the morphologic changes in the tissues of the eye. His experiments show, as do ours, that the substances produced in the body by poisoning with methyl alcohol are extremely diffusible and penetrate the eye readily.

We consider methyl alcohol to be a true hæmatotoxic. It has a decided effect upon all tissues, producing degenerations,

and under extreme conditions amblyopia or death. In reviewing the results of these experiments attention is directed to the similarity with those obtained through experimental researches and clinical observations in the internal administration of methyl alcohol, thus demonstrating its fatal and profound toxicity irrespective of the method of its entrance into the animal organism.

THE PATHOLOGY OF BELL'S PHENOMENON.

By Dr. ERNST KRAUPA,

Asst. at the German University Eye Clinic, Prague.

Translated by Dr. Alfred Braun, New York. From *Arch. f. Augenhlk.*, Vol. LXXV., 1913.

(*With two figures in the text.*)

THE phenomenon described by Bell in peripheral facial palsy, in 1823, and considered as a physiological act, namely, the movement of the eyeball upward and outward, on closing the lids, is to-day well known.

However, on the occurrence of the phenomenon under pathological conditions, we find very little in the literature.

An explanation of this can be found only in the fact that observers forget to note the position of the eyes during closure of the lids.

In the first volume of his *Archives*, A. v. Graefe writes the following about the movements of the eyes during closure of the lids:

"That the eyes roll upward during closure of the lids is a well-known fact, but even this rule seems to have its exceptions. In a boy, who had a lagophthalmos resulting from orbital caries, and in whom, as a result, the position of the cornea could be well observed, I noticed that, although at most times the cornea flew under the upper lid during attempted closure of the eye, occasionally, especially during forcible closure, the opposite movement occurred and the cornea disappeared completely under the lower lid."

Boucheaud noticed a similar occurrence in a case of facial paralysis which was in a regressive stage. But, as at the beginning of the paralysis no notice was taken of the eye-

movements, it could not be determined whether the reversal of the phenomenon was present at the beginning of the paralysis, or whether it only came on later. A second case of Boucheaud occurred in a patient with tabetic optic atrophy without facial paralysis.

Coppez found a downward Bell's phenomenon twice in two hundred individuals. He does not state, however, whether they were normal or pathological cases.

A more detailed report on the "perverse" Bell's phenomenon is given by B. Fleischer.

> The case was that of a 24-year-old workingman, who had his eyes injured in a powder explosion. The right eye became blind. From the left eyebrow to the edge of the lid there was a cicatricial band, which caused a shortening of the upper lid, and, on attempting to close the lids, a marked lagophthalmos. As the movements of the eyeball were in no wise disturbed, Bell's phenomenon could be very easily observed.
>
> A plastic operation was performed upon the lid, after which a lagophthalmos of 3*mm* remained. During the healing it was observed that on attempting to close the lids the lower lid was drawn up slightly and the eyeball rolled downward so that the cornea was covered by the lower lid. Two years later, examination showed a trichiasis of the upper lid, a lagophthalmos of 2*mm*, corneal epithelial changes, and vascularization at the upper sclerocorneal margin. Upon slight, as well as upon marked, efforts to close the eyes, the eyeballs moved downward and inward, and on the side of the lagophthalmos the cornea disappeared except for a small segment of the upper margin, which could be seen at the margin of the lower lid. Fleischer states specifically that the narrowing of the palpebral fissure occurred principally through upward movement of the lower lid, also that a swelling occurred in the flap on the upper lid.

In a second case of lagophthalmos with hydrocephalus, Fleischer observed a similar phenomenon. In a work which appeared during the printing of this article, Lauber reports three cases of hydrocephalus and one with aneurysm of the basilar artery and disturbances of the posterior cranial nerves, in which he found a reversal of Bell's phenomenon.

Jacobsohn observed, in a patient with bilateral peripheral

facial paralysis of surgical traumatic origin, that on closing the eyes the eyeballs went downward and inward.

In a patient with right-sided peripheral facial palsy due to purulent inflammation in the carotid, Schlesinger found that on closing the lids there were slow swinging movements of the eyeballs in the horizontal plane. The movements of the eyeballs could be observed very well through the thin lids, and through the lagophthalmos in the right eye. The excursions were considerable, and caused the cornea to approach the outer as well as the inner canthus. The same movements occurred also during sleep. When the eyes were open the eyeballs were still. After the facial paralysis cleared up these symptoms disappeared.

In a review of 34 cases of peripheral facial paralysis, Fumarola found the phenomenon 13 times upward and outward, 8 times directly upward, 6 times upward and inward, 5 times immobility of the eyes, once rotation downward and inward, and once directly inward.

The following case occurred under our observation.

Since 1909, the patient, J. A., at that time 8 years of age, has been under treatment at our clinic. The child is tuberculous, and had, at an early age, an extensive caries of the left orbital roof, which healed, leaving a marked cicatricial ectropion of the left upper lid. The lid was at that time so firmly adherent to the rough bone at its temporal extremity that the lid-margin was at that point only *3mm* distant from the orbital margin. There was, in the lateral $\frac{2}{3}$ of the lid, a marked ectropion, the tarsal conjunctiva and upper fornix forming a large swelling. The conjunctiva showed a coarse papillary hypertrophy.

There was a pannus keratitis in the upper part of the cornea, and maculæ in the center. On attempting to close the lids, the eyeballs went upward, only the lowermost part of the cornea remaining uncovered.

During vacation, a plastic operation was done on the upper lid, a flap being taken from the forehead, but was not successful.

In 1912, the patient again came to the clinic. The condition was about the same as at the first examination, the transplanted skin-flap having markedly contracted. On the upper orbital margin could be felt a broad exostosis. The left eye is *2mm* lower than the right, and distinctly

exophthalmic, but its movements are not interfered with, (Fig. 1).

Bell's phenomenon occurred in such a manner that, on closing the lids lightly, both eyes moved downwards, the left cornea being covered by the lower lid except for *2mm*. There was a lagophthalmos of *6mm* on the left side. On forcible closure of the lids, both eyes made a slight excursion upwards followed immediately by a downward movement under the lower lids. The lagophthalmos became more marked, the more forcible orbicularis contraction causing the ectropion to extend to the medial extremity of the lid (Fig. 2).

During sleep the eyes were also directed downward.

In the fall of the year 1912, the lid was separated from the bone, the exostosis chiseled away, a wedge-shaped portion of the everted lid excised, and a broad non-pedunculated skin-flap implanted on the anterior surface of the lid (Prof. Elschnig).

The result was satisfactory. After the operation, there occurred a spot on the upper lid, near the margin of the bone, from which tear-drops escaped. It was a fistula of the palpebral tear-gland, which healed after being cauterized with silver nitrate.

Now Bell's phenomenon no longer occurred downward but, in the normal manner, upward.

Although Fleischer, in the course of his observations, saw a reversal of Bell's phenomenon, we had the opportunity, in our case, of seeing a normal Bell's phenomenon change to an inverted one, and, after restoring the lids to normal condition, a return of the Bell's phenomenon to the normal.

In order to understand this remarkable anomaly of Bell's phenomenon in peripheral facial paralysis and cicatricial ectropion, which is contradictory to the rule—in former times Bell's phenomenon was considered a pathological symptom in peripheral facial paralysis—a knowledge of the conditions in central facial paralysis, in which Bell's phenomenon is wanting, is of considerable value.

However the publications of Marguliés and Hering, in which the absence of this phenomenon was first noted, have been scarcely acknowledged in the literature (I have found

Fig. 2

Fig. 1

them cited only by Schlesinger and Elschnig), so that I will take the liberty of going into the matter here.

Marguliés observed two cases with foci in the cerebral cortex. In the first case, there was unilateral, in the second, bilateral facial paralysis. In both cases, Bell's phenomenon was wanting, but in the first case only on the paralyzed side. In this case, the phenomenon returned when the paralysis got well.

A third case of so-called pseudobulbar paralysis was first observed by Hering, and later followed up by Marguliés. Marguliés assumes a bilateral focus in the internal capsule. Here, also, there was absence of Bell's phenomenon with bilateral facial paralysis. Even when, through reflex action, a forcible closure of the lids was effected, there was no movement of the eyeballs.

"On asking her to close the eyes, the upper lids sink slowly for a short distance, so that there is always a certain amount of lagophthalmos. The eyeballs remain immovable, even when she is asked to close the lids forcibly. If an object is rapidly brought before the eyes, the upper lid drops a little lower, but even here a small fissure remains between the lids, and there is no movement of the eyeballs."

Marguliés concludes from this that Bell's phenomenon is an associated movement coming from the cerebrum, whose occurrence seems to be connected with an intact and functionating voluntary impulse for lid-closure, as it disappears with the interruption of the latter and reappears with its restoration.

Hering assumes special corticofugal fibers for the synergic ocular movements, and takes under consideration the possibility that in the cerebral cortex there exists a connection between the cells for the eye and those for the lid movements. The author also draws attention to the fact that similar relations can be assumed in the case of the centripetal trigeminal fibers.

Negro observed involuntary innervation of the facial in a case of partial oculomotor paralysis.

Angela found, on severing the facial experimentally and stimulating the eye muscles by means of an electric current, that Bell's phenomenon occurred. Negro and Angela see here substitution movements, in which the impulse acted

upon the intact portion of the reflex tract. There must therefore be an anatomical connection between the nucleus of the facial and that of the oculomotor nerves.

However this explanation can only hold, if we look upon Bell's phenomenon as pathological in peripheral facial palsy, in that the upward movement of the eyes represents the substitution movement for the lid-closure.

The cases of Marguliés and Hering confirm, rather, the assumption of Michel, namely, a functional union between the corresponding cerebral centers.

Without a knowledge of the behavior of Bell's phenomenon in central facial paralysis, W. A. Nagel considers the former to be a reflex act. He assumes that the sensitive cornea seeks that position in which pressure of the lids on the cornea is lightest during closure of the lids. As the movement is most marked during forcible lid-closure, Nagel believes "that the excitation passes from some higher point in the cerebral cortex to the centers of the nerves of the ocular muscles, especially of the elevators of the eye."

This view is also confirmed by the experiments of Polimanti, who never saw absence of the reflex on cocainizing the eye.

Wilbrandt and Saenger hold a similar view.

"The movement of the eyeball upward, on closing the lids, is a very useful associated movement, in that with the reflex closure of the lids to protect the eye, cornea, iris, and lens hide behind the downward-drawn eyebrows, in order to be more safely hidden behind the protection, consisting of contraction of the muscle and thickening of the lid through application."

Fleischer also refutes Mendel's theory of a connection between the nuclei of the facial and of the elevators of the eyeball, because his case could then only be explained by a new-formed connection between the nuclei of the facial and the depressors of the eye. Such a possibility is of course out of the question.

Fleischer sees rather in his observation a support for Nagel's hypothesis. Fleischer assumes a subcortical center whose function it is to coördinate the activities of the oculomotor muscles with the orbicularis, which can adjust itself according to circumstances, and, under unfavorable circumstances, brings about a downward movement. In regard to the cases

until then unknown, of v. Graefe and Boucheaud (the cases of Coppez he does not take into consideration on account of the brevity of their report), he leaves it undecided, whether abnormal ocular movements on lid-closure might not have existed here, previously.

We cannot, however, in this way, explain the ocular movements which occur in other directions, as they were described by Schlesinger and Fumarola, as well as why in every case of peripheral facial palsy the phenomenon does not occur in any other direction than upward. We are more prone to accept Hering's hypothesis and to assume connections between the cortical projections of the facial and ocular muscles. The connection between the facial and the elevators of the eye, we must of course look upon as of primitive phylogenetic origin.

Only after long-continued irritation of the cornea do the other tracts come into activity in so far as they are sufficiently well developed.

Thus the abnormal eye positions mentioned by Fumarola occur, or Bell's phenomenon is wanting altogether in peripheral facial palsy, as the above-mentioned author states, although we are somewhat skeptical in this regard, the more so as in central facial paralysis, also, participation of the branch to the brow is possible (Mirallié, Roux, Margulies, Wilbrandt, and Saenger).

Schlesinger's case points to an irregular irradiation of the innervation, and a complete dissociation of the impulses, in which none of the innervations predominated, as is always observed in sleeping people, where complete dissociation of the eye movements exists and the eyes are not always directed upward and outward, but roll about in slow incoördinated movements.

So our case forms a link in the chain of proofs that in Bell's phenomenon we are dealing with a higher reflex, whose seat is in the cerebral cortex. I would like to mention the fact here, that in the new-born this reflex is wanting, which points to a higher seat than the nuclear region. In the hydrocephalic child with his lagophthalmos, those tracts become active right from the beginning, which bring about a covering of the eyeballs through the under lids, and in this way cause a reversal of Bell's phenomenon, as in the cases of Fleischer and Lauber.

From this it is evident that Bell's phenomenon is of great importance for the localization diagnosis of the neurologist.

From Bielschowsky's researches, it is seen that in certain disturbances of associated eye movements reflex eye movements are possible, while, in passive turning of the head, the position of the eyes is influenced by the vestibular apparatus. In these cases, we must conclude that the nuclear region is intact, and that the lesion is supranuclear.

In a similar way, we can diagnose a supranuclear lesion, if Bell's phenomenon is wanting. The location of the lesion is then usually in the cerebral cortex.

It would therefore be of considerable importance to note how Bell's phenomenon comports itself in associated paralysis, as, to my knowledge, there is nothing to be found on this subject in the literature.

We had the opportunity, a short while ago, to observe three sisters with total external ophthalmoplegia. Bell's phenomenon occurred in a normal manner. We were therefore forced to the conclusion that the nuclei of the ocular muscles were intact, but the tracts connecting the nuclei, especially the posterior longitudinal fasciculus, were congenitally defective, and we assume the disease picture to be one of congenital total ocular paralysis. These cases will be reported in detail in the future.

In conclusion, I wish to thank my honored chief, Prof. Elschnig, for his interest in this communication.

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III

II

I

Pineus, Ein Fall von doppelseitiger Tenonitis serosa acuta.

A CASE OF BILATERAL ACUTE SEROUS TENONITIS.

By Dr. F. PINCUS, Cologne.

Translated from the *Arch. f. Augenhl.*, Vol. LXXV., 1913.

(*With three illustrations on appended Plate IX.*)

PRIMARY tenonitis is a very unusual disease. Birch-Hirschfeld, in his careful study of tenonitis, in Graefe-Saemisch, was able to collect 40 cases of serous tenonitis, though he considered some of these to be doubtful as they were complicated with severe optic-nerve lesions. On the other hand, there were other cases which were not primary, such as the two cases observed by Birch-Hirschfeld himself, in which the tenonitis developed after an operation for squint. I thought that a report of an additional case was of interest, especially as I was able to obtain photographs of the condition at its acme, and because the symptoms with which the disease was accompanied in this case have not been previously observed.

On November 8, 1912, I was consulted by a young man in the early twenties, on account of a marked swelling of both eyes. The patient stated that on the night of the 5th of November, after having indulged freely in alcohol, he took a long drive in an open motor and in the evening of the 6th he suddenly was taken with general malaise, fever, pain in the neck, and swelling of the eyelids. On the following day his physician found a slight angina with a temperature of 100° and a swelling with bluish discoloration of the lids of both eyes. This condition increased until the 8th. The patient was otherwise healthy. There were no signs of either gonorrhea or rheumatic affection, and though repeated search was made for evidences of rheumatic diathesis, none were found.

On the morning of November 9th the general condition of the patient was better, temperature slightly elevated, pain in the neck diminished. He complained only of a sense of pressure and pain, which extended from the eye to the rest of the head. The lids of both eyes were dark red and very swollen. There was slight secretion in the eyelashes, which proved to be sterile on examination. It was striking that the swelling and discoloration of the lids were sharply limited to the tarsal part of the lids and did not extend toward the eyebrows nor to the nose, nor externally nor below. It was impossible for the patient to open his eyelids at all. On the other hand, they could be easily opened passively. The lids felt soft, could be everted, and this disclosed a normal conjunctiva. The eyeballs were dr ven forward and presented an enormous chemotic swelling of the conjunctiva which in places covered the cornea in the form of thick, yellow gelatinous hypertrophies. In the direction of the fornices the conjunctival folds became more red, in part dark red. The patient could not move his eyes and the attempt to do so elicited severe pain. On palpation one received the feeling as if the eyeballs were fast stuck in a hard mass. The cornea, the interior of the eyes, and vision were absolutely normal. The diagnosis of acute serous tenonitis was made and warm compresses and salicylate of soda were prescribed.

On November 10th the patient was free from fever and felt well, but did not show any improvement in his eye symptoms. On the following day he was able to just open the lids. The chemosis seemed less and the first evidences of returning motility of the eyes were observed. The pictures were taken at this time.

In picture I. the patient has been asked to open his eyes as wide as possible. The swelling of the lids is easily seen. In picture II. the head is held back; the characteristic form of the palpebral fissure is to be seen. In picture III. the lids are separated so that the enormous chemosis appears.

On November 12th the condition has still further improved. The lids had resumed their normal contour and were open, except at the extreme outer angle. The eye movements were free, somewhat restricted externally. The conjunctiva was no longer chemotic, though somewhat congested, especially in the outer angle and raising the outer half of the upper lid the accessory lacrimal gland was found to be very much enlarged. The orbital lacrimal gland could not be felt on palpation, though pressure in this position was painful. In the parotid region there was a swelling. The submaxillary and sublingual glands were distinctly enlarged and tender.

I did not again see the patient, but was informed that he recovered fully and resumed his usual occupation.

The diagnosis of this case is simple, as the picture was a typical one. I want particularly to emphasize the peculiar limitation of the discoloration of the swelling of the lids to the tarsal portion of the lids, which symptom is often connected with the name of O'Ferral. Berlin and Birch-Hirschfeld do not place much importance on the value of this symptom, as it does not appear regularly. I must confess that it was exactly this symptom that in this case, which is the first one of its kind that I have seen, suggested a state of congestion starting from the wall of the eyeball. My opinion of tenonitis was then confirmed by the enormous chemosis with the normal eyeball, a marked exophthalmus and complete immobility of the eyeball, together with the great pain produced by attempts to move the eye. Another characteristic feature was the feeling that on palpating the eyeball one received the impression that the eye was packed in a resisting swelling, which seemed to be limited from the rest of the orbit. I do not know whether this symptom has previously been described, and it may not be so pronounced in other cases. It is clear that this palpation was very painful to the patient. These symptoms excluded the retrobulbar affections which were observed in periostitis and diseases of the nasal sinuses. Birch-Hirschfeld described the following triad of symptoms in tenonitis, based upon the anatomic relationship of Tenon's capsule: (I.) moderate exophthalmus; (II.) chemosis; (III.) restricted motility of the eyeball with pain.

The benign course and the great improvement after five days also confirmed the diagnosis and made the character of the tenonitis seem a serous one. A complication of interest was the dacryoadenitis and the inflammation of the salivary glands. The photographs suggest from the typical shape of the palpebral fissure the likelihood of the affection of the lacrimal glands. It is evident that the painfulness in this region was not noticeable while all the tissues surrounding the eyeball were so tender, and the diagnosis of dacryoadenitis could not be made until the tenonitis was improving. It does not seem to me to be likely that the dacryoadenitis was the primary

condition which subsequently led by extension to a tenonitis. As far as I know, tenonitis as a complication of a dacryoadenitis is not known, though the latter condition is a relatively frequent one. Furthermore, we have no anatomic reason for believing such an extension. On the other hand, it is possible that the dacryoadenitis became involved indirectly from the tenonitis, possibly from the enormous congestion following the chemosis. This has not been observed in other cases. At the same time, with the severity of the symptoms of tenonitis, the dacryoadenitis may have been overlooked.

The simultaneous affection of all the salivary glands speaks against the connection of the dacryoadenitis with the tenonitis. It is well known that the salivary and lacrimal glands have a certain relation, and they are sometimes all involved, as for instance in mumps or in the so-called Mikulicz disease. It seems probable that in this case a common agent affected these various glands as well as caused the tenonitis. Most cases of primary serous tenonitis are supposed to be due to rheumatism or influenza. There were no signs of either infection in this case. The slight angina may have been the beginning infection in our patient. The frequently observed head cold was surely present in my case, for a ride in an open auto on a windy night, after excessive indulgence in alcohol, would surely furnish sufficient cause for taking cold to convince even the sceptic on the theory of taking cold.

This case is particularly interesting on account of the association of tenonitis with the inflammation of the tear and salivary glands. This association occurred in a case described by Panas.[1] In this case the tenonitis was associated with an exudate into the knee joint and an inflammation of the testicles, and was characterized by frequently recurring attacks in which the right eye was always involved with the right knee and the left testicle, while the left eye became affected together with the left knee and the right testicle. Panas regards the affection of these three organs as an expression of a rheumatic temperament. It is furthermore of interest to remember that in mumps we often find affection of the salivary glands and the testicles.

[1] *Semaine médicale*, 1897, January 13th. "Tenonitis and Double Orchitis."

REPORT OF THE TRANSACTIONS OF THE SECTION ON OPHTHALMOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

By GEORGE H. BELL, M.D., Secretary.

H. H. TYSON, M.D., CHAIRMAN. DECEMBER 21, 1914.

Dr. W. B. Weidler presented a patient with **tuberculosis of choroid.** The patient was 26 years of age, with a negative family history. No venereal history, and the Wassermann test was negative. The patient complained of a sudden loss of vision in the right eye, and came to the Manhattan Eye, Ear, and Throat Hospital, November 14, 1914. Vision: O. D., $\frac{20}{100}$; O. S., $\frac{20}{20}$. The right eye showed slight pericorneal injection, posterior corneal deposits, and opacities of the vitreous. The nerve head was indistinct and pale. The veins were swollen and turgid, especially the lower branches. There were several small hemorrhages on the disk. The retina throughout was hazy, and to the nasal side, about two disk diameters from the optic nerve, there was a pale gray area with undefined margins underneath the retinal vessels. Around the edges there were a number of small miliary, tubercle-like deposits. This was seen especially at the lower edge of the area, and above these little miliary spots, which number eight or ten, there was the early deposition of the pigment. Von Pirquet test was positive. A subcutaneous injection of $\frac{1}{2}mg$ of old tuberculin gave a general, local, and a doubtful focal reaction. The patient has been under treatment with B. E., and the fundus condition is clearing. Vision is now O. D. $\frac{20}{50}$.

Dr. Weidler also presented a case of **congenital fistula of the lacrimal sac.** The patient, aged 24, complains of tears flowing down the side of his nose; a small fistulous opening over the lower portion of the lacrimal sac. Passing probes

via the lacrimal puncta and the fistula, the tips of the two probes come in contact near the hilum of the sac. This is the second case of this sort seen by the author.

Discussion: Dr. H. H. TYSON stated that he had presented a case of congenital fistula of the lacrimal sac before the Section about four years ago. The patient was a boy 3 years of age. Using fluorescin in the eye, the stain could be detected both in the nose and by the colored tears discharged through the fistulous opening. He succeeded in closing the same permanently by cauterizing it with the galvano-cautery.

Dr. LINN EMERSON asked what Dr. Weidler proposed to do for the fistula, and advised the use of the galvano-cautery.

Dr. ARNOLD KNAPP presented a case of **pituitary disease with unusual eye symptoms.** The patient, a woman 32 years of age, has always been in good health except that she has suffered from amenorrhea for nine years. There has been a slight increase in weight, and some loss of hair. The eye symptoms consist in a loss of sight observed in the right eye, of one and a half year's standing. This progressed until it became completely lost ten months ago. She has also suffered from headache during this same length of time, principally in the right half of her head. She states that she has had her nose operated upon, but without benefit to her sight or the headache.

The examination of the right eye shows an immobile pupil, an optic atrophy, with the characteristics of a descending atrophy; no perception of light. The left eye is apparently normal in every respect. Even the color field shows no alterations, except possibly an interlacing of the red and blue perception in the nasal half. An examination of the nose shows that the sphenoid has been opened. It is at present clean and dry. The X-ray examination—a stereoscopic photograph of which is passed around—shows a complete destruction of the sellar region. The floor is depressed; both anterior and posterior clinoid processes cannot be recognized. The picture, taken from below upward, gives a shadow corresponding to the region of the sella, extending anteriorly to the right. The case is therefore one of tumor of the pituitary body which has broken through its capsule and involved the right optic nerve.

A few cases of one-sided blindness with non-involvement of the other eye have been reported. I think there are two

mentioned by Cushing in his book. Courtellement, in a paper on tumors of the pituitary body ("Les tumeurs du corps pituitaire": Congrès des Aliénistes, 1911), states that the treatment of pituitary lesions consists of three methods: 1st, opotherapy; 2d, radiotherapy; and, 3d, operation.

Opotherapy means the administration of thyroid gland. This he considers of no value. There are, however, some cases published in which the authors believe they have seen a relief of some of the symptoms. Our patient has now been on this for two weeks, without any improvement in her headache. Radiotherapy apparently offers greater prospects of help. There are three reports by Gramenga, Beclère (Soc. de Radiolog. méd. de Paris, Jan. 11, 1910), and Jangeas in which the X-rays have been applied through the mouth, through the nose, and at the temple, with a favorable result in some cases. It is intended to have this treatment carried out in the present case. As for the operative treatment, the unusual location of this tumor, outside of the pituitary fossa, and its extent, would make an operation practically impossible. In any case, it need not be considered until some signs are exhibited in the other eye.

Dr. E. M. ALGER presented a case of **divergence paralysis.** Patient is a widow, 54 years of age, who is said by her family physician to be organically sound. No Wassermann test has been made. Blood pressure is 150. Two months ago she suddenly became conscious of diplopia—objects at a distance only being affected. The diplopia is much less as she gets closer, and she has no diplopia in sewing or reading. The onset, though sudden, was not accompanied by nausea or vertigo. She is myopic (4.50 D.) and has worn glasses for distance only for many years. She has normal vision with each eye, and reads Jaeger No. 1 with either. Ophthalmoscopic examination shows nothing of note. Her pupillary and other reflexes are normal.

Tested with a light at twenty feet, she has a practically homonymous diplopia of 9°, with a barely perceptible right hyperphoria of 1° to 2°. There is no cyclophoria. When the fixation light is carried to the right or to the left, the diplopia does not increase but rather becomes slightly less. The hyperphoria, too, is unchanging. When the fixation object is

approached toward her, the diplopia becomes less and less, till at a distance of about eighteen inches vision becomes single and remains single up to three inches from the nasal root, where it becomes a crossed diplopia. When the light is withdrawn, she can maintain single vision to a distance of four feet. Measured by the tropometer, she has an inward rotation in each eye of 45°, and an outward rotation of 40°. With the hyperphoria corrected, her convergence power is only 20°.

My attention was first called to this condition several years ago by a paper of Dr. Duane's, and since that time I have seen some eight cases. The diagnostic points as given by him are: sudden onset, an unchanging homonymous diplopia for distance, which diminishes regularly as the fixation object is approached to the eyes till fusion is established at a rather definite point of equilibrium, within which there is single vision up to a point much nearer the nose than normal. The diplopia diminishes, or at least does not increase, as the fixation object is carried to either side. Single vision "by approximation" is secured at a definite distance, but single vision "by recession" is maintained some little distance further away. The rotations of the eyes in all directions, as measured by the perimeter or tropometer, ought to be normal.

The only conditions with which it is likely to be confused are: (1) paralysis of one or both externi; (2) spasm of convergence; and (3) a primary divergence insufficiency from which it differs only in degree. In the first, the diplopia would increase markedly as the fixation point was carried to one side or both while the lateral rotations of the eyes would be much reduced. The second shows a homonymous diplopia much more marked in accommodation and near at hand than at a distance, and one that is extremely variable and capable of rapid increase by prism exercise. The occurrence of such a condition is one of the arguments in favor of the existence of a definite fusion center, but its site is unknown except that it may be near the origin of the sixth nerve, since one or two cases beginning as divergence paralysis have finally developed a frank externus paralysis. The cause may be vascular (hemorrhage), toxic (diphtheria), or degenerative (tabes), and the prognosis naturally depends on the causative factor.

Discussion: Dr. H. H. TYSON said that he had treated one case of marked divergence paralysis, giving a specific history, with anti-specific remedies, thereby effecting a permanent alleviation of the distressing diplopia.

Dr. FRANCIS VALK did not think this a case of divergence paralysis, but rather one of exophoria.

Dr. G. H. BELL presented a patient who had had a **foreign body removed from the globe.** The man, aged 33, had his left eye injured by a piece of steel from a hammer, on December 2d. The next day he came to Dr. Price's clinic at the Infirmary at which time the vision was $\frac{20}{100}$. There was a central wound of cornea, a hole in the iris on the temporal side near the horizontal meridian. Iris, irregular; pupil, dilated; tension, minus.

The X-ray located the foreign body in the vitreous. The Haab magnet drew the piece of steel into the posterior chamber, and the small magnet was used to pull it into the anterior chamber, from which it was extracted after a small incision was made at the limbus, without an iridectomy. The size of the foreign body was 1.5 x 3*mm.* Fourteen days after extraction, the eye is perfectly quiet; the vitreous, slightly hazy; lens, perfectly clear; tension, normal; pupil, round and central; and vision, with correction, $\frac{20}{20}$.

Dr. L. W. CRIGLER presented a specimen of **dermoid tumor of the eyeball** obtained from a girl aged 13. The mother noticed a small, slightly elevated tumor situated on the left eyeball at the time of birth. She was repeatedly advised that the tumor was harmless as long as left alone.

Recently the tumor began to grow, and the patient came to the Manhattan Eye and Ear Hospital, on August 1st. Examination revealed a pale, white, somewhat elevated tumor, about the dimension and shape of the index finger-nail, situated on the left eyeball, occupying a position involving half the cornea and half of the adjacent conjunctiva, between the insertion of the external and inferior recti muscles. The growth was intimately adherent to both cornea and episcleral tissues. Its surface was somewhat dry and rough, and showed quite a number of stiff straight hairs standing perpendicular to the surface of the tumor, about one-third the length of the ordinary eyelash.

August 12th, under general anæsthesia, the growth was

removed by careful dissection. The conjunctiva in the vicinity of the tumor was undermined and drawn over the scleral attachment, leaving only the corneal wound bare of covering; this was swabbed with pure carbolic acid and alcohol, to make sure of a clean surface for corneal epithelial proliferation. In ten days the child was discharged from the hospital, and in three weeks the eye was perfectly quiet, nothing remaining but the scar in the cornea, covering the site of the tumor.

Microscopically the framework of the tumor is connective tissue, in the meshes of which are situated the hair follicles and sebaceous glands. There is a marked absence of blood-vessels and fat globules. The epithelial layer of cells is well defined, being more especially confined to the horny or stratified type.

These tumors should be removed before puberty, to forestall the possibility of growth and consequent impairment of vision. Their removal is easy and safe. This patient's vision was reduced to $\frac{22}{100}$ by the encroachment of the tumor on the pre-pupillary surface of the cornea. Earlier removal might have prevented this.

Dr. C. H. MAY showed an **electric ophthalmoscope** which presented a number of new features. There was an absence of the usual reflecting mirror, and in place of this a solid rod of glass of which the lower extremity was convex and acted as a converging lens, and the upper posterior portion was ground at an angle of 45° and silvered on the outside so as to serve as a reflector; this arrangement was practically indestructible. The lamp was of small size and was surmounted with a bi-convex lens. The ophthalmoscope was fitted with the double lens disks described by Dr. May in 1900, in which the convex lenses were moved into place by pressure of the finger upon the anterior milled circumference and the concave lenses were similarly manipulated by means of a posterior disk; the lenses followed each other in continuous sequence so that it was unnecessary to apply a quadrant, such as exists in the Loring instrument. Another advantage of this particular form of ophthalmoscope was that the metallic layers were very thin and the sight hole of each was of such a size that it covered every other aperture and its margin presented a beveled and sharp edge which diminished the possibility

of annoying reflexes when the blackening of the instrument wore off.

The most important feature of the instrument was the hiding of the film effect of the lamp so that there was a solid and even area of illumination; this contributed greatly to the ease of an examination, whether in the dilated or the undilated pupil. The concentration of light could be altered by raising or lowering the upper part of the instrument, thus separating or approximating the reflecting prism from the lamp. The instrument was equally effective in both the direct and the indirect methods. It could be used with either a battery handle or with cords, and any dry-cell battery could be attached. Finally, it had the advantage of being capable of change from the electric to the ordinary reflecting ophthalmoscope with tilting mirror, in case the lamp burned out or the dry cell became exhausted and there were no renewals on hand. The instrument was manufactured in either the double disk or in the simpler single disk form by the Wappler Electric Light Manufacturing Company, New York.

Dr. WELLS P. EAGLETON showed several cases of **dyspituitarism,** and made a few remarks about them.

REPORT OF THE TRANSACTIONS OF THE SECTION ON OPHTHALMOLOGY OF THE ROYAL SOCIETY OF MEDICINE.

By Mr. C. DEVEREUX MARSHALL, F.R.C.S., London.

The ordinary meeting of the Section was held on Wednesday, 3d of February, under the presidency of Mr. Priestley Smith.

Mr. Bernard Cridland showed a case of **glass-workers' cataract in an iron-smelter (puddler).** He brought the case to give an opportunity for the discussion of the type of case in iron-workers in relation to industrial diseases, as these men were not included in the schedule. Considering the number of hours of exposure to the glare of the molten metal, his surprise was that there were not more cases, especially as these men rarely wore protective goggles. He suggested that a more inclusive term should be applied to the cases of cataract so caused, such as "ray cataract."

Mr. C. B. Goulden said he had a case (a welder) now under care, and he thought an investigation would disclose that the condition was more common among iron-workers than was generally believed. The man who preceded his patient at the work also lost his sight. It was not until quite late that the workers complained, because, owing to the dilatation of the pupil which they had, they were able to see round the cataract.

Dr. Legge, of the Home Office, asked as to the proportion of iron-workers afflicted with this condition, as it was necessary in considering the scheduling of diseases to proceed tentatively. In the case of glass-blowers' cataract there could be no question as to scheduling, as he examined the lenses of 513 glass-blowers, and found cortical cataract in 64 in the right eye, 72 in the left.

Mr. J. H. Parsons said that, as Secretary of a Royal Society

Committee on the subject, he sent many inquiries to ophthalmic surgeons practising in iron-working districts, and the negative replies he mostly obtained led him to the belief that it was the custom of molders to wear tinted glasses. He asked for further evidence for his Committee to continue their investigations.

The President suggested the name "furnace-workers' cataract," seeing that furnace work was common to all.

Dr. COCKAYNE and Dr. ATTLEE showed a case of amaurotic family idiocy, in an English child, not Jewish as was the rule.

Mr. N. BISHOP HARMAN showed a case of spontaneous rupture of cornea in secondary glaucoma caused by dislocation of lens. An injury caused total dislocation of one lens into the posterior chamber, where it was loose. The resulting glaucoma was absolute, and vision was lost. The cornea was anæsthetic, the iris quite retracted and immobile. The condition remained for two years without ulceration of cornea or splitting of Descemet's membrane. Three months later, however, without any further accident, the cornea was split horizontally, and membranes were prolapsed, the cause of the rupture having been a retrochoroidal hemorrhage.

The President (Mr. PRIESTLEY SMITH) showed a form of trench periscope he had just designed. At the top of a narrow shaft, six feet in length, is fixed at an angle of 45° a plane mirror, about 2½ inches in diameter, and an exact counterpart lower down, the distance from the first being adjustable by pegs and holes. Only the top mirror projects above the trench, and this can be largely concealed by a piece of earth. By looking straight into the lower mirror, all movements can be plainly discerned without incurring danger.

Lieutenant-Colonel ELLIOT pointed out how necessary, in order to estimate the distance of the enemy, it was to have the binocular form of periscope.

A paper was contributed by Dr. F. E. BATTEN and Mr. STEPHEN MAYOU on **cerebral degeneration associated with macula changes,** and gave a pathological description of a case. In these cases a curious pigmentation occurred at the macula, and usually also around it, and considerable optic atrophy was also present. Several of the examples of the condition which had been under his care died at Darenth Asylum. He

exhibited the pedigrees of two families. In one case the changes in the macula were the last occurrences in the march of degeneration. The brains of these cases did not present any macroscopic abnormality, and they had the usual convolutional pattern, as well as the normal weight and relationship to the cerebellum. The brain and nervous system were examined by several staining methods. There was found to be some degeneration in the medullated fibers; in the cerebellum the myelin was breaking down, and degeneration was present in the cells of Purkinje. The most profound change was in the Betz cells: instead of the Nissl granules, there was a curious accumulation of fine granules around the nucleus. In the cerebellum were large granular cells not normally seen, and he could not say what their significance was. The most marked change was found in the child who had had the disease longest, namely, three and a half years. There were marked changes in the fundus, a shrinking of the convolutions, and in some cases the Betz cells were too degenerated to show the vacuolation. This group was similar to the Waren Tay–Sachs cases of amaurotic family idiocy, but occurring at a later age, and not race-selective. The disease now described was characterized by progressive blindness, progressive paralysis, and progressive dementia, but changes in the macula were not always present.

Mr. MAYOU dealt with the pathology of the eye condition. The child he examined had evidently lost all perception of light, but that was not so in all the cases. Immediately after death the eyes were injected and stained. The changes were confined to the retina, but varied enormously in different parts of the fundus. The principal change was round the macula region. The internal nuclear layers had disappeared altogether, also the rods and cones, and there was some migration of pigment from the retinal pigment cells.

The paper was discussed by Mr. PARSONS and Mr. TREACHER COLLINS, and the authors replied.

QUARTERLY REVIEW OF THE PROGRESS OF OPHTHALMOLOGY.

By H. KOELLNER, Berlin; W. KRAUSS, Marburg; R. KÜMMELL, Erlangen; W. LOEHLEIN, Greifswald; H. MEYER, Brandenburg; W. NICOLAI, Berlin; H. PAGENSTECHER, Strassburg; K. WESSELY, Würzburg; and M. WOLFRUM, Leipsic, with the Assistance of Drs. ALLING, New Haven; CALDERARO, Rome; CAUSÉ, Mayence; DANIS, Brussels; GILBERT, Munich; GROENHOLM, Helsingfors; v. POPPEN, Petrograd; TREUTLER, Dresden; and VISSER, Amsterdam.

Edited by MATTHIAS LANCKTON FOSTER, M.D., F.A.C.S., New Rochelle, N. Y.

SECOND QUARTER, 1914—(*Continued*).

XII.—ORBITS, EXOPHTHALMOS, ACCESSORY SINUSES.

85. ALT, ADOLF. **An intraocular sarcoma in coexistence with an orbital perithelioma.** *American Journal of Ophthalmology*, May, 1914, p. 131.

86. DUCAMP. **Syphilis of the orbit.** *Annales d'oculistique*, cli., p. 477.

87. FRIEDENWALD, HARRY. **Giant-cell sarcoma of orbit.** *American Journal of Ophthalmology*, June, 1914.

88. GOLOWIN. **A case of osteoma of the right orbit.** *Zeitsch. f. Augenheil.*, xxxi., p. 549.

89. GUTMANN, A. **Studies concerning the orbital displaceability of the eyeball in high degrees of refractive errors and increased intraocular tension.** *Ibid.*, p. 295.

90. HILFRICH, K. J. **Intraorbital complications in acute and chronic affections of the accessory sinuses.** *Zeitschrift f. Ohrenkrankheiten u. Krankheiten d. Luftwege*, lxx., p. 31.

91. KIMBLE, A. H. **Voluntary displacement of the eye.** *Jour. A. M. A.*, April 4, 1914.

92. MARKBREITER, J. **Further studies concerning the changes in the visual field observed in diseases of the nose and accessory sinuses.** *Zeitschrift f. Augenheilkunde*, xxxi., p. 316.

93. MAHER, W. ODILLO. **Notes on two unusual cases of pulsating exophthalmos.** *Ophthalmology*, April, 1914, and *Ophthalmic Review*, April 1914.

94. ONODI, A. **Ocular, orbital, intracranial, and cerebral complications of nasal origin.** *Medicinische Klinik*, p. 719.

95. PASCHEFF, C. **Detachment of, and white patches on, the retina in a case of streptococcic orbital abscess.** *Annales d'oculistique*, cli., p. 432.

96. PASCHEFF, C. **Transitory myopia in orbital cellulitis.** *Ibid.*, p. 426.

97. RAMSAY, A. M. **A fungating, bleeding, round-celled sarcoma which originated in the left orbit.** *Ophthalmoscope*, June, 1914, p. 339.

98. RAU. **A case of monolateral optic neuritis caused by chronic suppuration in the maxillary sinus.** *Centralbl. f. prakt Augenheilk.*, March, p. 69.

99. ROLLET. **Late results in six cases of removal of cancer of the orbit with preservation of the eye.** Soc. franç. d'ophtalm., May, 1914. *Ann. d'ocul.*, cli., p. 466, and *Archives d'ophtalmologie*, xxxiv., p. 257.

100. ROSENTHAL. **A case of choked disk in disease of the accessory sinuses.** *Zeitschrift f. Augenheilkunde*, xxxi., p. 549.

101. SEBILEAU, M. P. **Orbital abscess following a suppurative periodontitis.** *Annales d'oculistique*, cli., p. 241.

SEBILEAU (101, **Orbital abscess following suppurative periodontitis**) reports three cases of this nature. The extension of the purulent infection took place through the venous system and the bones. There are two ways in which the extension through the veins may take place, superficially through the facial vein which anastomoses with the ophthalmic vein in the inner canthus, and deeply through the anastomoses of the pterygoid plexus with the system of the cavernous sinus. In his first case the eye symptoms were particularly serious: great exophthalmos, eyeball almost immovable, nearly total amaurosis, and changes in the papilla with retinal hemorrhages. The suppuration started from the first premolar, had led to the casting off of a large sequestrum, and to an empyema of the maxillary sinus. The infection must have passed through the deep veins, if through the veins at all, but the absence of signs of meningeal irritation was in that case very remarkable. Hence he thinks that the infection spread through an ascending otitis. Recovery took place after several broad incisions, but with almost complete loss of sight. Sebileau insists that in these cases the prognosis as to vision is always bad, though the eye may regain its normal mobility. The second case, in which the infection came from an incisor, ran a less serious course; there was no disturbance of vision, but a paresis of the inferior oblique developed, which did not entirely disappear

on recovery. In the third case, a molar abscess, the eye symptoms were grave, the eye remained amaurotic, and the internal rectus paralyzed.

CAUSÉ.

GUTMANN (89, **Displaceability of the eye in refractive errors**) reports two sets of investigations. In the first he used only eyeballs the tension of which was registered as normal by the tonometer, and found as follows: In high axial myopia the axial displaceability of the globe into the orbit is diminished 0.3 to 0.4*mm* as compared with the emmetropic eye, in consequence of the greater circumference, but in some cases there was a tendency to secure a greater displaceability, and thereby a greater power of movement for quick glances, through an increase of the protrusion from the orbit of 2 or 3*mm*. The enlarged posterior segment thus acquired a capacity for extensive excursions. When the protrusion was over 15*mm*, say 17 to 19*mm*, the eyeball could be displaced approximately the same as an emmetropic one, while with a protrusion of 14 to 15*mm* the average reduction was 0.3*mm*. In high hypermetropia the eyeball could be pressed back considerably more than in emmetropia and in slight hypermetropia. The difference in the indices of high hypermetropia and high myopia are particularly striking. In asymmetry of the two sides of the face the displaceability varies with the protrusion, even though the refraction of the two eyes is the same. The variation is very distinct when there is a great difference in the refraction. The second set of investigations dealt with increase of tension. When the intraocular tension is increased to about 40*mm* of mercury the displaceability into the orbit is diminished 0.3 to 0.4*mm*. After normal tension had been regained by an operation the displaceability was found to be normal also. The author explains this phenomenon as due to the increase in volume of the globe in greatly increased tension, and to the obstruction of the outflow of the blood and lymph.

PASCHEFF (95, **Detachment of, and white patches on, the retina in a case of orbital phlegmon**) saw a girl 12 years old, with an orbital abscess which presented an interesting picture of the fundus, namely, an extensive detachment of the retina below, corresponding to the seat of the abscess and numerous

small white patches on the temporal side of the disk and around the macula. Some of the patches were superficial, others quite deep, underneath the retinal vessels. Vision was reduced to perception of light. The intraocular pressure was 50*mm* Hg. The evacuation of the pus was soon followed by a marked reduction of the tension and partially of the detachment. A re-examination of the eye four months later showed the persistence of numerous white shiny patches and yellowish pigmented striæ above, below, and also in the macular region, located in the deeper retinal layers. The retina below seemed to be slightly detached. Vision amounted to counting fingers on the temporal side of the field.

SCHOENBERG.

PASCHEFF (96, **Transitory myopia in orbital cellulitis**) saw a patient with non-suppurative orbital cellulitis and myopia of the right eye. A 3.50 sph. improved the vision from $\frac{5}{20}$ to $\frac{5}{5}$. After the inflammatory condition subsided, the eye became emmetropic and the vision was $\frac{5}{5}$ without a glass.

SCHOENBERG.

ROLLET (99, **Late results of extirpation of cancer of the orbit with preservation of the eyeball**) has recently examined six of his patients operated on for malignant tumors of the orbit, one, two, two, five, six, and eight years ago. The results remained as good as just after the operation. The eyeballs were preserved with perfect mobility and with good vision wherever there was no previous optic atrophy. No recurrence took place, except in one patient. The author insists upon an early operation and expresses his satisfaction with his own method of entering the orbit, which, contrary to Kroenlein's, does not injure the bony walls of the orbit. The method is simple and consists in a curved incision following the margins of the orbit either below and temporally, or above and internally, according to the supposed location of the tumor. Since in most of the incipient cases, the new growth has no adherences with either the bone, or the soft tissues in the orbit, the author always found it easy to quickly shell out the tumor, which is usually situated in the space between the periosteum and the muscular cone.

SCHOENBERG.

FRIEDENWALD (87, **Giant-cell sarcoma of the orbit**) removed a tumor through an incision along the upper orbital margin. The report states that it was a typical giant-cell sarcoma, highly cellular, and pervaded with hemorrhages. It had the cardinal features of a myeloid sarcoma, and no previous record of such a tumor of the orbit has been found.

ALLING.

ALT (85, **Intraocular sarcoma coexisting with an orbital perithelioma**) gives the clinical history and histological findings in a case of this nature. He thinks it likely that the orbital tumor, a perithelioma, was the older, and that the intraocular, pigmented angiosarcoma was of more recent date. That is, that in this case two tumors, an orbital one and an intraocular one, grew separately and coexisted until probably the sclera was perforated near the optic-nerve entrance by the intraocular growth and the two tumors were thus joined together.

FOSTER.

A little growth appeared on the upper-inner margin of the orbit of an elderly man five years after a contusion, and attained in the course of ten years the size of a walnut, forcing the eye downward. It was firmly adherent to the bone. GOLOWIN (88, **Osteoma of the right orbit**) removed two osteomata that came from the frontal sinus. He also found a little osteoma situated deeply in the orbit that came from either the ethmoid or the frontal sinus.

The first case described by MAHER (93, **Two unusual cases of pulsating exophthalmos**) developed exophthalmos of the right eye after a severe blow on the head. The eye was enucleated, and three weeks later the left began to protrude and to pulsate. The pulsation and bruit could be stopped by pressure on the right common carotid. Ligation of the right internal carotid resulted in a cure. He thinks that the enucleation of the right eye caused a clot to form in the anterior part of the right arterio-venous aneurysm. Pressure on the right carotid then dilated the circular sinus connecting the two cavernous sinuses, and thus the pressure on the right internal carotid was conveyed to the left cavernous sinus, producing pulsating exophthalmos of the left eye.

The second case, after fracture of the skull, developed left exophthalmos, which gradually subsided, but at the same time

the right became proptosed. The pulsation of the right side was controlled by pressure on the left carotid. The left internal carotid was tied and the case recovered. In this case a clot probably formed in the same way, resulting in a spontaneous cure, but the pressure was transmitted to the right side.

ALLING.

KIMBLE (91, **Voluntary displacement of the eye**) records the interesting case of a man thirty years old, who was an inmate of a hospital for the insane, and had acquired the habit of pressing his finger into the orbit below the left eye. Within a few weeks he was able to force the eye out of its socket and through the palpebral fissure. The eye was always more proptosed than the other. The right pupil reacted normally but the left only consensually. The left optic nerve was atrophic, the vessels normal in appearance. The globe was at least an inch from its normal position when extruded.

ALLING.

ROSENTHAL'S (100, **Choked disk in disease of the accessory sinuses**) had symptoms of an empyema of the left ethmoid, with exophthalmos and choked disk of the left eye. These symptoms were relieved at first by operation, but later the left eyeball became still more exophthalmic and a commencing choked disk appeared in the right. Opening of the ethmoid from the orbit revealed a neoplasm which proved to be a spindle-cell sarcoma.

The number of ocular and orbital symptoms that ONODI (94, **Ocular, orbital, intracranial, and cerebral complications of nasal origin**) has observed in cases of disease of the accessory sinuses is remarkable. He emphasizes the enlargement of the blind spot and a central scotoma as important early symptoms of retrobulbar optic neuritis. In many cases it is difficult to determine whether the visual disturbances present are accidentally or etiologically associated. Early recognition of the rhinogenous origin of the visual trouble and quick intervention are essential. A free opening and evacuation of the posterior accessory sinuses is indicated even in slight lesions of the optic nerve.

HILFRICH (90, **Intraorbital complications in affections of the accessory sinuses**) describes the complications he has observed in nine cases. These consisted of swelling of the contents of

the orbit, causing protrusion and limitation of movement of the eyeball, diplopia, and headache. The acute onset of an exophthalmos may be sometimes the only external symptom of a disease of an accessory sinus. Such affections of the eye as iridochoroiditis, cataract, and opacities of the vitreous, he considers metastatic. The most dangerous complication is disease of the optic nerve. His cases show that these complications may be made to disappear by timely thorough operative treatment of the cavity affected, but it is not well to direct the procedure solely against the abscess. Incisions in the peribulbar tissue, and even the opening up of some of the ethmoid cells are usually insufficient.

MARKBREITER (92, **Changes in the visual field in diseases of the nose and accessory sinuses**) investigated the visual field in a hundred cases of empyema of the accessory sinuses, excluding all in which the eye showed changes that might cause disturbances in the field of vision. The empyema in 63 of these 100 cases was in the anterior, in 9 in the posterior, and in 3 in all of the accessory sinuses, while in 25 the exact localization was not specified. Of the 63 cases of anterior accessory sinuses 17 were of the frontal sinus, 31 of the maxillary sinus, 3 of the anterior ethmoid cells, and 1 of the anterior ethmoid cells and the frontal sinus. A change was found in 70 of the 100 cases although the fundus was normal and the vision perfect. Such changes were present in 48 of the 63 cases of empyema of the anterior accessory sinuses, and in 7 of the 9 cases in which the trouble was in the posterior. Twenty of the 70 cases were examined later; sixteen had a normal field, the defect persisted in four. The change in 52 of the 70 cases was enlargement of the blind spot, in 7 central scotoma, in 11 peripheral contractions, island or ring scotomata. Enlargement of the blind spot occurs seven times as often as central scotoma. The enlargement of the blind spot was alone in only 28, in nearly half it was associated with other changes. Central scotoma was alone in 6, only once associated with other changes. The enlargement of the blind spot always appeared earlier for colors than for white, and in very many cases these changes in the visual field were present when the vision and the fundus were perfectly normal. The author has never seen enlargement of the blind spot pass later into central scotoma. He

finds, therefore, enlargement of the blind spot to be the most common eye symptom of empyema of the accessory sinuses, but it presents no diagnostic features by which it may be determined whether the empyema is in the anterior or the posterior sinuses. He also found changes in the visual field in 11 out of 37 cases of non-suppurative disease of the accessory sinuses, hence they are not only not characteristic of disease of the posterior ones, but also not of empyema.

RAU (98, **Monolateral optic neuritis caused by chronic suppuration in the maxillary sinus**) treated a patient with optic neuritis, vision and field being normal, for a year with injections of mercury, iodide of potassium, and sweating, with a good result. As the neuritis recurred at the end of two years with decrease of vision, with frontal headache and pain on percussion over the frontal sinus, the patient was examined rhinologically and found to have an empyema of the maxillary sinus. Perfect recovery followed surgical intervention. It is noticeable in this case that the empyema of the maxillary sinus caused severe pain in the region of the frontal sinus, while its own region remained free from pain, even on percussion.

RAMSAY (97, **A fungating, bleeding, round-celled sarcoma which originated in the left orbit**) reports a case in a boy of fourteen years of age which followed a blow on the left eye two months previously. The swelling and ecchymosis soon disappeared, but seven weeks afterward he noticed the eye becoming prominent, with lids red and swollen, but no pain. As the tumor grew, the hemorrhages became alarming in frequency and amount. The tumor grew to one and a half pounds in weight, and was a typical round-celled sarcoma.

CURRAN.

XIII.—CONJUNCTIVA.

102. ARMAIGNAC. **A curious case of hereditary pterygium.** *Soc. franç. d'ophtalm.*, May, 1914, *Annales d'oculistique*, cli., p. 469.

103. BOULAI and COLLET. **Parinaud's conjunctivitis.** *La clinique ophtalm.*, xx., p. 348.

104. BROWN, S. H. **Herpes simplex affecting the palpebral and bulbar conjunctiva simulating lues.** *American Jour. of Ophthalmology*, May, 1914.

105. CASALINO. **Clinical and pathological contribution concerning angioma of the conjunctiva.** *Arch. di Ottalm.*, October, 1913, p. 206.

106. FALCHI. **Spotted inflammation of the conjunctiva.** *Ibid.*, 1913, p. 1.

107. GEBB. **Experimental studies concerning the relations between inclusion blennorrhea and trachoma.** *Zeitschrift f. Augenheilkunde*, June, p. 475.

108. KARDO. **Treatment of trachoma with carbonic-acid snow.** *Ibid.*, April–May, p. 450.

109. LEBER, A. **Samoan conjunctivitis.** *Arch. f. Ophthalm.*, lxxxvii., p. 528.

110. LEBER and PROWAZEK. **Desquamative epitheliosis of the South Sea.** *Ibid.*, p. 534.

111. MEYERHOF. **Is there a natural or acquired immunity to trachoma?** *Revue générale d'ophtalmologie*, xxxiii., p. 145.

112. PETERKA. **Treatment of photophobia in eczematous conjunctivitis.** *Muenchener medizinische Wochenschrift*, 1914, p. 1228.

113. SATTLER, C. H. **On the action of anæsthetics in subconjunctival injections.** *Archiv f. Ophthalmologie*, lxxxviii., 2, p. 259.

114. SATTLER, C. H. **On the action of acoin in subconjunctival injections.** *Ibid.*, p. 277.

115. TABARISKY. **Ætiology of pseudopterygium.** *Zeitschrift f. Augenh.*, April–May, p. 447.

116. THOMSON, ERNEST. **Iritis associated with the diplobacillus (Morax-Axenfeld).** *Ophthalmoscope*, May, 1914.

BOULAI and COLLET (103, **Parinaud's conjunctivitis**) observed a case of this disease in a woman 50 years of age. There were no signs of tuberculosis and the bacteriological examination was negative. The disease developed in a typical manner; treatment consisted of hot compresses and astringents and complete recovery took place within two months without any affection of the other eye and without complication. The swelling of the glands also went down.

CAUSÉ.

LEBER (109, **Samoan conjunctivitis**) has studied in Samoa an endemic form of conjunctivitis, called Samoan, which is due to the diplococcus Samoensis. It begins as a very acute conjunctivitis, sometimes resembling gonorrhea. The preauricular gland is swollen; rhinitis and pharyngitis are present. There is œdema of the upper lid, small hemorrhages appear on the bulbar conjunctiva, and the conjunctiva of the lids and fornix is swollen. The discharge is at first thin, but soon becomes purulent. Sometimes the periphery of the cornea becomes hazy. All of these symptoms disappear under appropriate treatment in nine or ten days, and complete recovery is the rule. Absence of treatment or wrong treatment however

may lead to perforating ulceration of the cornea and even to phthisis bulbi.

SCHIRMER.

THOMSON [116, **Iritis associated with the diplobacillus (Morax-Axenfeld)**] reports a case of conjunctivitis due to the Morax-Axenfeld bacillus associated with iritis. He suggests that the iritis was due to the absorption of toxins from the conjunctiva. Both became well under zinc treatment.

CURRAN.

PETERKA (112, **Treatment of photophobia in eczematous conjunctivitis**) recommends methylhydrocuprein for its anæsthetic action in these cases. He reports two particularly obstinate cases which recovered completely after the use of a 5% solution instilled two or three times a day.

MEYERHOF (111, **Immunity to trachoma**) concludes that there is neither racial nor individual immunity to trachoma. One attack of the disease is no guard against another. Serum treatment therefore seems to be hopeless. In some cases there is an interval of several years between the affection of the first and that of the second eye. Among 2828 private patients he found only seven in which the disease was confined to one eye.

CAUSÉ.

TABARISKY (115, **Pseudopterygium**) found typical Halberstaedter-Prowazek bodies in the epithelium of fresh cases of trachomatous pannus, that disappeared as the pannus retrograded. If the pannus continued the bodies became conical or pear-shaped. He considers pseudopterygium a consequence of acute conjunctivitis, and that trachoma of infants must be considered ætiologically.

GEBB (107, **Relations between inclusion blennorrhea and trachoma**) experimentally transferred material for inoculation from an infant with inclusion blennorrhea to several patients. The result confirmed him in the belief that there is no ætiological identity between inclusion blennorrhea and trachoma. The virus produced in adults an infectious disease exactly like, clinically, the inclusion blennorrhea of infants, but no trachoma, or symptoms resembling it, developed even after several years. The temperature of the room, or low temperatures, have no effect upon the vitality of the virus, but it is killed by higher temperatures.

KARDO (108, **Treatment of trachoma with carbonic-acid snow**) has tried this remedy in 92 cases, mostly in the second stage, with good results. The other eye was treated otherwise for comparison. The snow produces a rapid absorption of the follicles, but its effect is confined to the place where it is applied.

Subconjunctival injections produce hyperæmia of the ciliary body and the aqueous secreted becomes richer in albuminates and antibodies. SATTLER (113, **Action of anæsthetics in subconjunctival injections**) has studied by experiments on rabbits the question whether or not the addition of anæsthetics diminishes the effect of the salt injection. The results of a large series of experiments go to show that the effect on the ciliary body is considerably diminished by cocainizing the conjunctiva, or by the addition of cocaine to the fluid injected. The reason is not the contraction of the vessels caused by the cocaine, but the paralysis of the sensitive nerves which interrupts or diminishes the reflex action. Different drugs interfere, to varying degrees, with the effect of the salt solution. The effect is diminished most by cocaine, less by novocain or alypin, not at all by acoin.

SCHIRMER.

SATTLER (114, **Acoin in subconjunctival injections**) has found that a 1% solution of acoin injected beneath the conjunctiva has disagreeable by-effects if given in too large doses. More than 0.2*ccm* produces adhesions between the sclera and the conjunctiva; more than half a cubic centimeter may cause considerable shrinkage of the conjunctival sac and lasting opacities of the cornea. Not more than 0.1*ccm* of a one per cent. solution of acoin should ever be injected.

SCHIRMER.

LEBER and PROWAZEK (110, **Desquamative epitheliosis of the South Sea**) describe the anatomical findings in this disease, which is frequent on the islands of the Pacific Ocean. It resembles inclusion blennorrhea, and its inclusion bodies look very much like those of blennorrhea and trachoma.

SCHIRMER.

BROWN (104, **Herpes simplex affecting the palpebral and bulbar conjunctiva**) saw a young girl with an extreme œdema of the lids and conjunctiva which subsided after a few days,

leaving a large vesicle of the conjunctiva of the lower lid. After rupture of the bleb the area was covered with exuberant granulations that lasted about six weeks. Although the appearances resembled those of an initial lesion, the Wassermann test was negative, and the diagnosis of herpes was made. (A negative Wassermann can hardly disprove the possibility of an initial lesion, unless the test is made several weeks after its appearance, as the test cannot be positive until after the infection of syphilis has spread generally throughout the organism. —F.)

ALLING.

FALCHI'S (106, **Spotted inflammation of the conjunctiva**) patient, 22 years old, had a hyperæmic conjunctiva with a burning feeling, photophobia and lacrimation, together with a slight fever following an attack of neuralgia of the second branch of the trigeminus. With the aid of a magnifying glass little, scattered points could be seen which joined into little spots in a few days, and these blended later into white patches of irregular shape having a diameter of from 3 to 7*mm*. These began to retrogress at the end of eight or ten days, gradually became whitish, and disappeared. The rest of the eye and conjunctiva remained normal. Repeated recurrences took place during the next five years, sometimes as many as three in a year. Pathological examination showed changes in the various tissues of the conjunctiva, mainly of a degenerative type. Bacteriological examination revealed the staphylococcus albus. The best treatment seemed to be bandaging the eye, instillation of cocaine and boric-acid solution, with the simultaneous administration of quinine and arsenic.

CALDERARO.

ARMAIGNAC (102, **Hereditary pterygium**) found eight out of twenty-two persons in one family afflicted with pterygium of both eyes; two of them had four pterygia each on the two eyes. He thinks that the cause of this is a hereditary trophic disturbance, like that of nævi.

CAUSÉ.

CASALINO (105, **Angioma of the conjunctiva**) reports three cases. In one the little tumor was situated in the palpebral conjunctiva, in both the others in the bulbar. The writer classifies them among the true angiomata with extensive

teleangiectasis of the vessels, which depends on a traumatism to the entire conjunctival tissue. All of the tumors were thoroughly removed.

CALDERARO.

XIV.—CORNEA AND SCLERA.

117. ATTIAS. **Periodic marginal keratitis.** *Arch. di Ottalm.*, Oct., 1913, p. 187.

118. BONNEFON. **Experimental researches on keratoplasty.** *Arch. d'ophtalm.*, xxxiv., p. 193.

119. COCKAYNE. **Hereditary blue sclerotics and brittle bones.** *Ophthalmoscope*, May, 1914.

120. FERONI. **Keratectomy.** *Annal. di Ottalm.*, f. 5–8, p. 490.

121. HASELBERG. **A case of keratoplasty.** *Berl. ophthalm. Ges.*, June 25th.

122. KAZ. **Eserine ointment in the extensive infiltrations of scrofulous keratitis.** *La clinique ophtalm.*, xx., p. 352.

123. KUEMMELL. **Treatment of ulcus serpens.** *Muenchener med. Wochenschrift*, p. 1326.

124. MEISNER. **Metastatic scleral abscess.** *Klin. Monatsbl. f. Augenheilk.*, May, 1914, p. 708.

125. PICCALUGA. **Five cases of filamentous keratitis.** *Annali di Ottalm.*, f. 5–8, p. 496.

126. STREBEL. **Gonorrheal keratitis after reinjection of gonococcus vaccine. Metastatic gonorrheal conjunctivitis.** *Muench. med. Wochensch.*, p. 1448.

127. WATANABE. **Pathological condition in parenchymatous keratitis due to congenital syphilis, with special reference to the new growth of connective tissue on the posterior surface of the cornea.** *Klin. Monatsbl. f. Augenheilkunde*, March–April, 1914, p. 408.

The removal of the focus of infection by means of a circular incision in the healthy tissue, passing deeply into the parenchyma of the cornea, but not quite through it, gives good results in suppurative keratitis, according to FERONI (120, **Keratectomy**). The infectious process may be arrested in this way, and a quick cicatrization secured which results in a less dense leucoma.

CALDERARO.

BONNEFON (118, **Experimental researches on keratoplasty**) gives a highly interesting study of the question of transplantation of the cornea. His work consisted of the study of the macroscopical and microscopical changes that take place in pieces of cornea transplanted from one eye to the other: (1) of the same animal (autoplasty); (2) of two animals belonging

to the same species (homoplasty); (3) of a guinea-pig to a rabbit (heteroplasty); (4) of a chicken to a rabbit (heteroplasty). A careful consideration of the facts furnished by the experiments in the first three groups, autoplasty, homoplasty, and a certain heteroplasty (guinea–pig–rabbit), leads to the following conclusions: The epithelial layer persists in the transplanted cornea and keeps its traits characteristic to the guinea-pig, as shown by the differences in staining properties and microscopic appearances even months after the transplantation is performed. The fixed cells of the substantia propria of the transplanted piece of cornea become necrotic, disappear, and are replaced by young connective-tissue cells which migrate from the cornea of the host. The heterokeratoplasty performed between chicken and rabbit, however, shows a different evolution, namely, all the cellular elements (the epithelium included) of the transplanted cornea become necrotic; there is no sign of regeneration, and the piece of transplanted cornea disappears by a process of slow absorption; it is replaced by connective tissue and epithelium which originate in the cornea of the host. We have to deal with two corneæ (rabbit and chicken) which are of an entirely different anatomical type and for this reason the transplanted cornea acts like a foreign body and does not take. In the other group of experiments, namely autoplasty, homoplasty, and heteroplasty (guinea–pig–rabbit), the transplanted cornea is assimilable since it belongs to the same anatomical type. According to the author, it cannot be denied that both the cornea of the host and the one transplanted play each an important rôle: the former to furnish the cells for the parenchyma; the latter, the epithelium and also to stimulate and regulate the entire process of regeneration. The author summarizes the teachings of his experiments and their application to keratoplasty in human beings in the following three propositions: (1) The successful transplantation of a cornea depends on both the piece of transplanted cornea and the cornea of the host. (2) Only the experimental keratoplasty fulfills the requirements of an ideal operation: the transplantation of a transparent cornea on a transparent cornea. For this reason, mainly, do such experiments succeed so infrequently. (3) In keratoplasty practiced on human beings, the cornea is transplanted on an opaque

cornea, and for this reason the result is a failure. The paper is well illustrated with microphotographs and plates.

SCHOENBERG.

HASELBERG (121, **Keratoplasty**) reports the case of a patient on whom Froelich performed keratoplasty on June 13, 1913, with a remarkably good result. The patient had suffered from childhood from recurrent attacks of keratitis, until finally the cicatrices had completely blinded the eyes so that she could no longer go about alone on the street. He happened to have the opportunity to use a fresh, transparent piece of cornea from a woman 22 years old whose eye had to be enucleated on account of atrophia dolorosa. He first removed with Hippel's trephine a disk 3*mm* broad and ½*mm* thick from the center of the opaque cornea, leaving Descemet's membrane intact. Then in the same way he took a piece of the same size from the cornea of the second patient, without Descemet's membrane, and used it to replace the piece taken from the first. Both patients lay together on the same operating table. The flap was secured in place by two vertical silk threads lying parallel and close together that had previously been introduced 3*mm* above the margin of the cornea. The dressing was changed on the third day when the conjunctival sac was found to be full of accumulated mucus, in spite of which the piece of cornea was adherent. Then a little opacity set in, which disappeared again in a few days. There was no budding of blood-vessels in the transplanted piece. The vision has remained $\frac{1}{60}$ for a year and no opacity is to be expected any longer. The patient is able to go about alone, and can read Jaeger 23, though with difficulty, at 5*cm*. In the evening she needs a companion on the street, but she is able to do her housework alone, which was impossible formerly.

ADAM.

WATANABE (127, **Pathological condition in parenchymatous keratitis**) had the opportunity to enucleate an eye with fresh parenchymatous keratitis from a patient 18 years old, and to examine it histologically. He divides the corneal tissue into three layers. The outermost layer he found least altered; a slight œdematous infiltration may be inferred from the dilatation of the fluid spaces; the epithelium was irregularly thickened and was provided in many places with conical

processes which give a wavy course to Bowman's membrane and the most anterior layers of the parenchyma. The changes in the middle layer were greater. Between the bundles of fibers were heaps of mononucleated round cells, partly arranged in rows, with newly formed vessels surrounded by cells. The fluid spaces were not dilated, and the bundles of fibers lay closer together than in the anterior layer. The posterior layer was the most diseased, which showed in some places a great infiltration of cells, in others necrotic patches. The tissue had apparently been œdematous, had been driven slightly toward the anterior chamber, and took no stain in places. The total absence of vessels was striking in contrast to the middle layer. These findings were mainly in the central portion. In the periphery the infiltration of cells came into the foreground, together with many bands of connective tissue. The intact Descemet's membrane had its posterior surface covered by a layer of connective tissue structurally like that of the cornea, which apparently came from the sinus of the chamber, was relatively thick in the periphery, grew thinner toward the center, and showed a moderate infiltration of cells throughout. Peripheral folds of Descemet's membrane and of the most posterior layers of the parenchyma were evident consequences of the tendency to sclerosis and to firm fixation of the connective tissue. Hyperæmia and a moderate infiltration of cells were also present in the scleral and episcleral tissues.

The case of gonorrheal keratitis reported by STREBEL (126, **Gonorrheal keratitis after reinjection of gonococcus vaccine**) occurred in a woman 25 years old, who presented all the indications of an endogenous disease—that is, she had urethritis with gonococci at the time of the first attack of keratitis, together with other signs of a general gonorrheal infection, absence of any other cause, absence of gonococci in the conjunctival sac, and a keratitis presenting an unusual picture. The primary seat of the infiltrate was subepithelial, in the parenchyma of the cornea, another indication that the infection was endogenous. As the keratitis appeared twenty-four hours after a reinjection of 10*ccm* of gonococcus vaccine, it may be that it should be considered an anaphylactic keratitis, that it was a local reaction to the injection of homologous bacterial albumin.

KAZ (122, **Eserine ointment in scrofulous keratitis**) recommends eserine ointment because of the wonderful effect one often sees on the blepharospasm and on the cornea itself. He ascribes the benefit to the quieting of the iris, together with the relaxation and better drainage of the infiltrated cornea. The contraction of the pupil enlarges the surface of the iris, unfolds the crypts, and opens more broadly the filtration angle, producing a better condition of nutrition, and so easier healing of the ulcerated cornea. It is probable that the pupil is commonly much dilated in spite of the blepharospasm.

CAUSÉ.

PICCALUGA (125, **Filamentous keratitis**) distinguishes two forms of this peculiar disease, of which he has had the opportunity to observe five: (1) the idiopathic or typical; (2) the post-operative or atypical. The first form includes all those cases in which the affection appears in apparently healthy corneæ with ulcers, and in interstitial or herpetic keratitis; the second, those following operation or deep wounds of the cornea.

CALDERARO.

KUEMMELL (123, **Treatment of ulcus serpens**) describes the methylhydrocuprein treatment. After rendering the cornea anæsthetic he applies a 2% solution, holding it in contact for half a minute. Then he instills a 1% solution every hour, taking care that it comes in actual contact with the ulcer. This is maintained until the ulcer is thoroughly cleansed. It may be necessary to apply the 2% solution a second time in obstinate cases. The iritis is treated with atropine. He reports seventeen cases thus treated which show clearly the good effect of the remedy, only one proving obstinate.

ATTIAS (117, **Periodic marginal keratitis**) saw a man 52 years old, in good general condition, who for several years had suffered from attacks of pain in his right eye, often lasting two or three days, and occurring periodically every twenty-eight or thirty days, accompanied by a slight pericorneal injection. The conjunctiva presented many swollen vessels that penetrated into the upper layers of the cornea, where there was a whitish opacity *2mm* from the limbus, and occupying a third of the corneal circumference. In the intervals there were no inflammatory symptoms, and no signs of ulceration ever appeared

CALDERARO.

MEISNER (124, **Metastatic scleral abscess**) reports a case of this nature seen in a man 46 years old who was suffering from furunculosis, post-gonorrheal arthritis, and posterior urethritis. The scleral abscess was incised, staphylococcus aureus was found in the pus, the blood was sterile though a chill a few days before indicated that the blood current had been flooded with the micro-organisms. The source of the infection could not be definitely ascertained, the staphylococci may have come from a furuncle, or from a primary focus in the bladder or prostate. The staphylococcus aureus could be found in the urine, and the prostate had been massaged shortly before the occurrence.

COCKAYNE (119, **Hereditary blue sclerotics and brittle bones**) reports a case of a child who had blue sclerotics, and X-rays showed thinning of the extremities of the shafts of the long bones. The epiphysis showed no evidences of rickets. The child's father and his sister had blue sclerotics and broke their bones with apparently insufficient cause. The grandfather and his sister had brittle bones, as also did the great-grandfather. Cockayne thinks the defect is one of the mesoblastic tissue development.

CURRAN.

XV.—IRIS AND PUPILS.

128. CHAILLOUS. **Treatment of transparent cysts of the anterior chamber with electrolysis.** *Annales d'oculistique*, cli., p. 461.

129. FINKELNBURG. **Double reflex immobility of the pupils after traumatism to the skull.** *Deutsch. med. Wochenschrift*, p. 1005.

130. JOCQS and DUCLOS. **Ocular tuberculosis.** *Ann. d'ocul.*, cli., p. 465.

131. NONNE and WOHLWILL. **Clinical and anatomical study of a case of isolated reflex immobility of the pupil, paralysis, tabes, and cerebrospinal syphilis being excluded.** *Neurol. Centralbl.*, 1914, p. 611.

132. RAUBITSCHEK. **Tumors of the iris.** *Klin. Monatsbl. f. Augenh.*, p. 683.

133. TERTSCH. **Spontaneous cysts of the iris.** *Arch. f. Ophthalm.*, 88, p. 72.

134. ZUR NEDDEN. **Pupillary difference in consequence of unilateral corneal scars.** *Klin. Monatsbl. f. Augenheilkunde*, lii., p. 844.

JOCQS and DUCLOS (130, **Ocular tuberculosis**) report the case of a boy 15 years old in whom a superficial lesion of the cornea led to the development of a grave tuberculous disease

of the cornea and iris that rendered enucleation necessary. In the cornea were whitish nodules separated from one another by clear tissue. In the microscopical preparations characteristic tuberculous changes could be seen in the cornea and iris, but no bacilli could be found.

CAUSÉ.

RAUBITSCHEK (132, **Tumors of the iris**) describes three cases. One was mixed melanosarcoma and endothelioma. The unpigmented, rather atypical connective-tissue parts represented perhaps intermediate steps in the development of the melanosarcoma cells. The second was a granulation tumor, the origin of which could not be ascribed to tuberculosis either clinically or bacteriologically. A wound and the presence of a foreign body were excluded also. The third was a tumor of granulation tissue with a central abscess of doubtful ætiology. Tuberculosis was excluded.

CHAILLOUS (128, **Electrolysis of transparent cysts of the anterior chamber**) passes a needle, the positive pole, through the limbus into the cyst and sends through it for two minutes a current of four milliamperes. He reports the case of a young girl treated in this manner, in whom there had been no recurrence at the end of a year.

CAUSÉ.

TERTSCH (133, **Spontaneous cysts of the iris**) divides cysts of the iris into those that lie in the stroma, and those situated in the layers of the pigment epithelium. Of 51 cases reported in literature 37 belong to the first group. The cyst forms a gray, lustrous bleb extending almost to the cornea. The preferable treatment is excision of part of the iris with the cyst, but injection of tincture of iodine has been proposed. Another classification of these cysts that he proposes is to divide them into three groups: (1) cystoid transformation of endothelial or epithelial cells implanted in the stroma of the iris, or a cystoid dilatation of hollow spaces in the stroma; (2) distention of a preformed hollow space on the posterior surface of the iris, formed by a ciliary process; (3) a situation between the layers of the pigment epithelium with development toward the posterior chamber.

ZUR NEDDEN (134, **Pupillary difference in consequence of unilateral corneal scars**) has seen in several cases of central,

dense opacity of the cornea a dilated pupil in the other eye. This is not always the case, but is to be seen often. In none of the cases could he find any special cause for the dilatation of the pupil. He supposes that the eye with the central scar adjusts itself to be able still to see by dilating its pupil. This peculiar adjustment seems to be suitable because of the absence of binocular vision.

FINKELNBURG (129, **Double reflex immobility of the pupils after traumatism to the skull**) gives as conditions of the presence of a traumatic double reflex immobility of the pupils that (1) the normal function existed before and immediately after the accident; (2) the injury was considerable; (3) the immobility appeared after at least eight days; (4) syphilis is absolutely excluded. The case he describes fulfilled these conditions almost perfectly. The possibility that convergence and accommodation were paralyzed at first is not quite excluded, so an ophthalmoplegia interna may have been present. It is difficult to say where the cause lies, but we have to think of a lesion of the central part of the reflex pupillary arch.

NONNE and WOHLWILL'S (131, **Isolated reflex immobility of the pupils**) case was a rare one of reflex immobility of the pupils without any other indications of tabes, general paresis, or cerebrospinal syphilis to be found. Autopsy revealed pulmonary tuberculosis, degeneration of the cardiac muscle, syphilitic aortitis. The brain and spinal cord were perfectly normal. Hence it seemed to be a trace of a former syphilitic affection that had apparently been cured, especially as the examination of the liquor was negative. Such a case is rare and is a warning to care in the diagnosis of taboparalysis.

XVI.—LENS.

135. ANDOGSKY. **A contribution to the ætiology of opacity of the lens.** *Klinische Monatsblaetter fuer Augenheilkunde*, lii., p. 824.

136. BURDON-COOPER. **Pathology of cataract; the hydrolysis theory.** *Ophthalmic Review*, May, 1914, p. 129.

137. CONSTANTINESCO. **Advancement of the conjunctiva in extraction of cataract.** *La clinique ophtalm.*, xx., p. 74.

138. DANSFORTH, C. H. **Some notes on a family with hereditary congenital cataract.** *American Journal of Ophthalmology*, June, 1914.

139. FALCHI. **Cataract operations in diabetics.** *Arch. di Ottalm.*, 1913, p. 41.

140. GOLDSCHMIDT. **The mechanism of the disintegration and absorption of the lens.** *Arch. f. Ophthalm.*, lxxxviii., p. 405.

141. GUANAITA and ANNONI. **Efficient treatment of post-operative infection of the eye.** *Ibid.*, p. 558.

142. HIPPEL. **Abderhalden's method in senile cataract.** *Ibid.*, lxxxvii., 3, p. 563.

143. JOCQS. **Intervention in traumatic cataract.** *La clin. ophtalm.*, xx., p. 71.

144. MEYER-STEINEG. **The non-operative treatment of senile cataract.** *Wochenschrift f. Ther. u. Hyg. d. Auges*, 1914, Nos. 27 and 28.

145. MULGUND, N. **A method of operating on immature cataract with shallow anterior chamber.** *Ophthalmoscope*, April, 1914, p. 207.

146. PASCHEFF, E. **Cataract extraction combined with a peripheral iridectomy.** *Annales d'oculistique*, cli., p. 424.

147. VACHER, L., and DENIS, M. **Conjunctival bridge, conjunctival flap, suture of the cornea, and Van Lint's suture in the operation for cataract.** *Ibid.*, p. 409.

148. VALUDE, E. **Cataract extraction with or without iridectomy.** *Ibid.*, p. 250.

149. VAN LINT. **Postoperative astigmatism in cataract extraction with sliding of the conjunctiva.** *Ibid.*, p. 418.

150. VAN LINT. **Temporary paralysis of the lids provoked by the operation for cataract.** *Ibid.*, p. 420.

151. VOGT. **Clinical and anatomical contribution to the subject of senile cataract.** *Archiv f. Ophthalmologie*, lxxxviii., 2, p. 329.

Roemer and Gebb have claimed that Abderhalden's optic method shows constant differences between serums of normal and cataractous individuals, the latter giving positive results. VON HIPPEL (142, **Abderhalden's method in senile cataract**) found in a series of twenty-eight cataract patients that only three showed a positive reaction, and this was obtained by the ninhydrin as well as by the optic method. Roemer's results are due to errors in the experimental technique.

SCHIRMER.

Becker and Foerster seemed to have proved by the careful examination of commencing cataracts *in vivo*, as well as *in toto* after extraction, and by the microscopical examination of sections, that the formation of cataract always begins at the surface of the nucleus, or within the cortex, never just beneath the capsule. Hess has claimed in recent years that in the majority of cases the first cataractous opacities are found directly under the capsule, and founded on this preponderancy of the subcapsular onset his theory. Roemer, in his serological

researches, accepts the subcapsular onset as an undoubted fact. Nevertheless there are no careful examinations in existence to prove that the subcapsular layers are the starting point. No picture of a subcapsular cataract is found in literature, although splendid pictures of the supranuclear form are given in all text-books. In order to corroborate or refute the views of Hess, VOGT (151, **Clinical and anatomical contribution**) has made very careful clinical and anatomical researches in a large number of commencing cataracts. He has examined more than four hundred patients over 60 years of age in homatropine mydriasis with the loupe mirror, many of them with Zeiss's binocular corneal microscope. More than ninety per cent. showed beginning opacities in the lens, but in not one of them was the onset directly under the capsule. The first opacities were found mostly at the surface of the nucleus. Vogt furthermore has examined fifty lenses of old people extirpated from corpses. They were embedded in vitreous and examined with a 24–54-fold enlargement. The surface was quite intact in all of these cases. Several of the lenses were cut in halves, when the cross-section again showed the onset to be at some distance from the capsule. Based on these extensive and careful researches, Vogt makes the assertion that Hess's claim of the subcapsular onset of cataract, and all theories resting on this anatomical ground, are erroneous.

SCHIRMER.

It is mentioned in few text-books that skin affections may lead to the development of cataract. ANDOGSKY (135, **Ætiology of opacity of the lens**) reports four cases of so-called cataracta dermatogenes. The opacities develop early, on both sides, and usually in the form of an anterior stellate cataract. Later the picture becomes that of a complete soft cataract, the length of time required varying greatly. The prognosis of operation is good. The ætiological connection is difficult to determine.

MEYER–STEINER (144, **Non-operative treatment of senile cataract**) has dealt with this subject before. He now reports further experiences and maintains his stand that commencing cataracts may be influenced, improved, and caused to disappear medicamentally. He has observed fifty-four cases, and the condition has grown worse in only four; the rest were all

improved. One is therefore justified in saying that a good effect may be obtained in four-fifths of the cases. He regulates the patient's mode of life, gives him ½ to 1 tablet of iodglidine daily, and instills locally iodide of sodium 0.05 to 0.1: 10.0, later with dionin added. Eye baths and subconjunctival injections have the same result. He recommends that a trial be made of medicamental treatment in suitable cases of incipient cataract. Even when the treatment fails, it produces an excellent psychical impression upon the patient. One has also the satisfaction of feeling that he has done what he could when an operation finally becomes necessary.

According to FALCHI (139, **Cataract operations in diabetics**), the extraction of cataract may be undertaken in diabetics when the general condition is satisfactory, and the sugar is no longer increasing. Better results are obtained in young patients than in older ones. The result is bad when there has been an iritis already, probably because of its tendency to recur. When there is double cataract, both must not be removed at the same sitting. Preliminary iridectomy is to be avoided as it may easily excite an iritis. In case the diabetic has had no treatment prior to coming for an operation, it is best to try to reduce the sugar and to build up his strength before attempting it. The visual results may be good or only moderate, and are permanent. Extraction may be contraindicated by the general condition, an increase of glycosuria, diseases of other organs, or the onset of preliminary symptoms of diabetic coma.

The treatment of postoperative infection according to GUANAITA and ANNONI (141, **Efficient treatment of postoperative infection**) is as follows: If the margins of the corneal wound are infiltrated, whether the anterior chamber is reformed or not, the wound must be more or less extensively cauterized according to the degree of the infiltration. At the same time subcutaneous injections are to be given in the temple of 15*cg* of calomel in ½*gr* of a mixture of equal parts water and glycerine, while injections of polyvalent antistreptococcus serum are to be given in the abdomen. This injection is to be repeated from three to five times every other day. It causes no disturbance. Morning and evening 10*cg* of calomel are given by mouth for several days. The eye is covered with cloths

wet in cold boric-acid solution, changed every ten minutes. Every six hours, four times a day, hot boric-acid compresses are applied, with the instillation of a 1% solution of picric acid, and after ten minutes of a 1% solution of atropine. The same treatment may be used in deep wounds of the eye, in case the infection is not very far advanced.

CALDERARO.

MULGUND (145, **A method of operating on immature cataract with shallow anterior chamber**) injects sufficient normal saline into the anterior chamber to make it deeper for the operation of removal of cataract where there is a shallow anterior chamber. This is done with a very fine needle, exactly at the limbus. He has done it in eighteen cases and, in each case, it has proved satisfactory.

CURRAN.

PASCHEFF (146, **Extraction with a peripheral iridotomy**) recommends a peripheral incision of the iris in cataract extraction in order to obviate the disadvantages of a complete iridectomy or of a prolapse of the iris.

SCHOENBERG.

VAN LINT (149, **Postoperative astigmatism in cataract extraction with sliding of the conjunctiva**) replies to his opponents who object to his method on the ground that the pressure of the flap may increase the astigmatism, by reporting that in three cases he has found an astigmatism of 2.5, 4, and 3.5 D., respectively, shortly after the operation, which is not above the usual amount found after the classical methods in use.

SCHOENBERG.

CONSTANTINESCO (137, **Advancement of the conjunctiva in extraction**) has used the following method in seventy-five cases and has seen no infection. He first dissects up the conjunctiva for about 1*cm* toward the caruncle, the upper transition fold, and the outer canthus, and inserts sutures ready to tie. Then he performs the operation in the usual way. Finally he ties the sutures, which should draw down the conjunctiva so as to cover nearly half of the cornea. If the wound is insufficiently covered, the covering must be made complete. The sutures are removed in a week. He points out the danger of postoperative infection from lacrimal passages that functionate only too well, especially in atrophic rhinitis and old,

unrecognized diseases of the accessory sinuses, but he is convinced that a thorough application of his method will prevent any infection whatever. The only objection is the slight prolongation of the operation.

CAUSÉ.

VACHER and DENIS (147, **Conjunctival bridge, conjunctival flap, suture of the cornea, and van Lint's suture in extraction**) compare the advantages of these various methods of closing the wound after an extraction, and conclude that the maintenance of a conjunctival bridge uncut, extending from the cornea to the rest of the bulbar conjunctiva, is the best method. Their experience is based on about a thousand operations, and they assert that the various dreaded complications, like folding back of the cornea, loss of vitreous, prolapse of the iris, incarceration of the capsule, iritis, secondary cataract, glaucoma, and panophthalmitis, are thus best avoided.

SCHOENBERG.

VALUDE (148, **Cataract extraction with or without iridectomy**) maintains that cataract extraction with iridectomy is to be preferred, not only because of its prevention of incarcerations of the iris in the wound, but mostly on account of the facility with which the cortical mass can be extruded. It has the great advantage of preventing a secondary cataract.

SCHOENBERG.

BURDON-COOPER (136, **Pathology of cataract; the hydrolysis theory**) has conducted a series of micro-chemical analyses of the aqueous and of the lens in cataract. He finds tyrosin to be constantly present in the aqueous in cases of cataract. In all of the cases there was much tyrosin and cholesterin in the lens. He argues that tyrosin of the aqueous comes from the lens and that it is brought about by hydrolysis of the lenticular proteid. His researches agree with clinical observations that cataract need not be a constantly progressive condition, but that comparatively sudden lens changes may take place, and that there is a definite relationship between cataract and renal insufficiency. The hydrolysis theory, too, according to Burdon-Cooper, explains the occurrence of black cataract. He finds no evidence of blood pigment on spectroscopic examination of three black cataracts, and therefore discards the theory of infiltration of hæmatin. He argues that the color of the lens is

due to oxidation of tyrosin with the production of pigment, and holds that the hydrolysis theory is the only one which can explain satisfactorily the occurrence of black cataract.

CURRAN.

VAN LINT (150, **Temporary paralysis of the lids after extraction**) has found that the injection of 3–4*cc* of a 1% solution of novocain containing three drops of a 1 : 1000 solution of adrenalin hydrochloride along the branches of the facial nerve going to the orbicularis produces a temporary paralysis of both lids. He employs this method in cataract extraction in order to prevent any pressure and consequent loss of vitreous during the extraction, mostly in unruly patients. The technique is simple. The syringe has to be large enough to contain 3 or 4*cc* and the needle needs to be about 3*cm* long. The needle is introduced 1*cm* behind the external orbital margin on the same level as the lower orbital border; it is then pushed horizontally and slightly downward deeply along the periosteum. When it is completely inserted it is gradually withdrawn and half of the solution is pressed out of the syringe into the tissues. The injection is made along the other branches of the facial by directing the needle from the same point of entrance towards the upper border of the orbit, running along the periosteum and injecting the solution while retiring. The injection takes effect in three minutes, and the orbicularis is paralyzed for about two hours. The safety of the procedure and the feeling one has that the patient is not able to squeeze his lids over the opened eyeball during the operation give great comfort to the surgeon.

SCHOENBERG.

DANSFORTH (138, **Hereditary congenital cataract**) reports a family in which the grandmother, both her children, and six out of eight grandchildren had congenital cataracts. He brings out the point that lamellar cataracts may be of two kinds, one having origin in some disturbance in intrauterine life, the other hereditary. The latter seems to be less typical in form. It would seem important to be able to distinguish between the two for eugenic reasons. Nothing is known of the embryology of congenital cataract although some experiments have been carried on in animals. ALLING.

JOCQS (143, **Intervention in traumatic cataract**) does not believe in waiting too long for the spontaneous absorption of a

traumatic cataract; he prefers rather to operate as soon as it is certain that the opacities will undergo no retrogression. He reports a case of an intraocular injury with a splinter of iron in a man 27 years old, in which the iron was smoothly extracted through the wound of entrance on the day after the accident. The diffuse opacity of the lens seemed at first inclined to clear up, but the course was slow, so after about three months he extracted the lens in a single sitting with an excellent visual result.

CAUSÉ.

GOLDSCHMIDT (140, **Mechanism of the disintegration and absorption of the lens**) finds that the albuminous substances of the lens are partly soluble in water, partly not soluble. The former include α crystallin, β crystallin, and albumin, the latter albumoid. As we know from daily experience that the entire lens can become dissolved in the aqueous, there must be a way to change the albumoid into a compound that gives a colloidal or a real solution. This can be accomplished by simple autolysis, as is proved by the dialysis of a lens in a hose against distilled water. In the living eye, however, this process is accelerated by a proteolytic ferment of which a small amount is present in the normal aqueous. The irritation due to the swe'ling lens increases the quantity of this ferment, for which the lens fibers have a great avidity of absorption. Finally blood elements are to be mentioned. They also contain proteolytic ferments which they deliver when in contact with the swollen lens fibers.

SCHIRMER.

XVII.—VITREOUS AND CHOROID.

152. ARISAWA. **Metastatic carcinoma of the choroid from a latent primary tumor.** *Klinische Monatsblätter f. Augenheilkunde*, lii., May, 1914.

153. HAM. **Retinochoroiditis juxta papillaris.** *Ibid.*, p. 484.

154. KOMOTO. **So-called atrophia gyrata of the choroid and retina.** *Ibid.*, p. 416.

155. RERRAL. **Peripapillary sarcoma of the choroid.** *Annali di Ottalm.*, f. 5–8, p. 539.

HAM (153, **Retinochoroiditis juxta papillaris**) adds one more case to the few of this disease that have already been observed. The affection began in his patient at the age of 17 with ob-

scured vision and pain. A whitish infiltrate formed near the papilla, but this never extended to the macula. The vision was good, but there was a permanent defect in the field. An artery ran through the pathological focus. The prognosis is good. There is no treatment. The ætiology is doubtful; there were no signs of syphilis or of tuberculosis.

NICOLAI.

KOMOTO (154, **Atrophia gyrata**) says that only six cases of atrophia gyrata of the retina and choroid have been reported, to which he adds another. Symptoms common to all are consanguinity, hemeralopia, reduced vision, contracted visual field, and myopia. The entire clinical course of the disease gives the impression that it is a congenital process, like retinitis pigmentosa, that develops early.

NICOLAI.

It rarely happens that a tumor in the eye imposes upon one as primary, when it is really metastatic and the primary tumor gives no clinically demonstrable signs. ARISAWA (152, **Metastatic carcinoma of the choroid**) describes such a case. A thorough general examination revealed no condition to lead one to suspect the presence of a tumor in any other place, so the diagnosis was made of a sarcoma of the choroid and the eye enucleated. The microscopical examination proved it to be a carcinoma. A year later intestinal trouble developed, and some months afterward autopsy revealed a carcinoma of the rectum. The metastasis into the eye usually takes place through the posterior ciliary arteries.

RERRAL (155, **Peripapillary sarcoma of the choroid**) reports the case of a man 68 years old who had noticed three months before that he had lost the sight of his right eye, and had suffered from severe pains in the brow for over a month. The pupil was immobile, and dilated incompletely under atropine. A circumscribed yellowish mass, having a diameter of four papillæ, could be seen springing from the region of the papilla, with many vascular anastomoses on its surface. The retinal vessels portrayed the form and position of the tumor distinctly. Tension was 18*mm* of mercury. Cutaneous reaction and Wassermann were negative. The eye was enucleated and the tumor found to be a papillary leucosarcoma of the choroid.

CALDERARO.

XVIII.—GLAUCOMA.

156. BEHR. **Anatomical changes and filling up of excavations in the papilla in the course of glaucoma.** *Klin. Monatsbl. f. Augenheilk.*, June.

157. BUDEK. **Two rare infections of the eye.** *Prager med. Wochensch.*, No. 9.

158. BUTLER, T. H. **Holth's punch operation for glaucoma.** *Ophthalmoscope*, June, 1914, p. 329.

159. FAGE. **Prognosis and treatment of hydrophthalmos.** *Ann. d'ocul.*, cli., p. 460.

160. FORONI. **Sclerectomy from outside.** *Annali di Ottalm.*, f. 5–8, p. 483.

161. HEERFORDT, C. F. **Remarks on the glaucomatous congestion of the anterior ciliary vessels.** *Arch. f. Ophthalm.*, lxxxvii., 3, p. 494.

162. ISCHIKAWA, K. **Schnabel's caverns.** *Ibid.*, p. 429.

163. KUEMMELL. **Glaucoma and diseases of the cardiovascular system.** *Muenchener medizinische Wochenschrift*, No. 18.

164. LAGRANGE. **To elevate the ocular tension.** *Ann. d'ocul.*, cli., p. 460.

165. LOEHLEIN. **Glaucoma and the general organism.** *Zentralbl. f. d. ges. Ophthalm.*, Part 9.

166. MORAX and FOURRIERE. **Surgical treatment of chronic glaucoma.** *Annales d'oculistique*, cli., p. 321.

167. PAUL. **Late infection after Elliot's trephining.** *Klin. Monatsbl. f. Augenheilkunde*, May, p. 701.

168. PUSCARIN, ELENA. **Elliot's sclerocorneal trephining in secondary glaucoma.** *La clinique ophtalm.*, xx., p. 215.

169. REBER, WENDELL. **Report of twenty-six sclerocorneal trephinings, Elliot's operation, for glaucoma.** *Ophthalmoscope*, April–May, 1914.

170. ROCHON-DUVIGNEAUD. **Contribution to the study of the results of sclerocorneal trephining with iridectomy (Elliot's operation).** *Ann. d'oculistique*, cli., p. 455.

171. ROLANDI. **High myopia and glaucoma.** *Annali di Ottalm.*, f. 5–8, 1913.

172. SULZER, M. D. E. **The results of surgical treatment of glaucoma from its beginning to the present time.** *Ann. d'ocul.*, cli., p. 401.

173. YOUNG, GEORGE. **Decompression in glaucoma.** *Ophthalmoscope*, April, 1914, p. 194.

YOUNG (173, **Decompression in glaucoma**) claims that to reduce hypertension it is not necessary to open the anterior chamber or touch the uvea; and that success lies in causing single or multiple leaks in the sclera. He holds that hypotonies are due, not to trephining, but to iridocyclitis caused by wounding the sclera. Young makes a large conjunctival flap down as far as the corneal attachment, and trephines two

1.5*mm* holes 6*mm* apart, in the sclera very close to the cornea, but not taking in any corneal tissue and not injuring any other structures. The flap is then closed by sutures. He claims to get drainage through the ciliary body.

CURRAN.

FORONI (160, **Sclerectomy from outside**) proposes a modification of Lagrange's operation. After forming a conjunctival flap he excises a wedge-shaped piece of the sclera 5*mm* long by means of two converging incisions with a Graefe knife.

CALDERARO.

PUSCARIN (168, **Elliot's sclerocorneal trephining in secondary glaucoma**) reports five cases of secondary glaucoma from traumatic cataract, adherent leucoma, and chronic iritis, in which she performed sclerocorneal trephining. She obtained a diminution of tension in all and an improvement of vision in two.

SCHOENBERG.

ROCHON-DUVIGNEAUD (170, **Results of corneoscleral trephining with iridectomy**) says that the operation was borne well in two cases of hemorrhagic glaucoma, but a filtration cicatrix was not formed; in one case the tension recurred, in the other the eye became hypotonic with detachment of the retina. In eleven eyes with secondary glaucoma the operation produced a beneficial effect in only one. Of six eyes with primary absolute, or far advanced, glaucoma none healed with an œdematous scar, but two were relieved from pain, though the tension remained high. In two cases of acute glaucoma the tension was reduced, though without a filtration cicatrix. Excellent results were obtained in four out of ten eyes operated on for chronic intermittent glaucoma. Twenty-five cases of glaucoma simplex were trephined, but only sixteen could be followed; in thirteen of these a filtration cicatrix with subnormal tension was attained, giving about 70% of good results, about the same as in chronic glaucoma with inflammatory intermissions. In the other forms of glaucoma the operation must be used with care. In the discussion Lagrange emphasized the point that the sclera alone should be the seat of the operation, and that the cornea and ciliary body must remain untouched. Abadie has performed a great number of iridectomies and is much pleased with his results. It is neces-

sary that the technique be faultless. At any rate he believes that an iridectomy should be performed first, and that only when this operation has failed should we perform sclerectomy or trephining.

CAUSÉ.

BUTLER (158, **Holth's punch operation for glaucoma**) prefers this operation for glaucoma on the grounds that it is easier and safer, and quicker than all others. It is devoid of many of the dangers of the Elliot operation, such as pressure of trephine, dislocation of lens, losing the disk in the eye. He uses it now for all varieties of glaucoma. Butler, however, uses a lighter pattern of punch than Holt's modification and also his own special broad needle for making the incision. He has done twenty-nine cases, four of which failed owing to defective technique. One case showed free filtration but tension was not reduced; and the sixth was a case of late infection; the remaining twenty-three were successful.

CURRAN.

MORAX and FOURRIERE (166, **Surgical treatment of glaucoma**) deal with the results of surgical treatment of chronic glaucoma during the last eight years at the Lariboiserie. Thirty-seven men and forty women have been operated on. Five were between 30 and 40 years of age, the majority between 50 and 70. Both eyes were affected in all but fourteen. Iridectomy and sclerecto-iridectomy were employed; the latter at first according to Lagrange's method, later according to Holth and Fergus-Elliot. As many as three trephinings were needed in some cases; when the tension was particularly high a posterior sclerotomy was performed in order to avoid a brusque fall of tension. Complications observed were one each of loss of vitreous, expulsion of the lens with prolapse of vitreous, and expulsive hemorrhage. The last case resulted in atrophy, but the other two did well. Postoperative complications were twisting of the flap after trephining, long persistent hyphæma, and postoperative pain. Late infection was observed after sclerectomy, likewise a serious hemorrhage into the vitreous, and a late opacity of the center of the cornea. The restoration of the anterior chamber required a shorter time after Lagrange's and Holth's operations than after trephining. In general it was observed that the slower re-

formation of the anterior chamber gave a better prognosis for the formation of a filtration cicatrix and therefore for the compensatory action of the scar upon the tension. Iridectomy was performed alone only twenty-three times since the tonometer began to be used, and this generally proved insufficient. The tension remained within normal limits during a prolonged period of observation in 22 out of 24 cases of Lagrange and Heth operations, in 17 out of 21 trephinings. Persistent fistulæ remained in 20 out of 30 operated on by the Lagrange-Holth method, in 16 out of 21 trephinings. The period of observation ranged from two weeks to six and a half years. The functional results were good at the end of a year or more in 14 cases of sclerecto-iridectomy and in 5 cases of trephining. The danger of the operation is not increased by a much contracted visual field. Holth's operation he thinks the one of choice, next is Elliot's. The object is to obtain a filtration scar, but in spite of it the tension is often seen to rise again and the eye to be lost. Late infection cannot always be avoided.

CAUSÉ.

REBER (169, **Report of twenty-six sclerocorneal trephinings for glaucoma**) in his experience with twenty-six cases had, among others, the following points impressed upon him:

1. The glaucomatous eye can be approached by the surgeon with more hopefulness than before.
2. We must expect a longer postoperative reaction on account of the aqueous finding a new channel for filtration and here acting somewhat as a foreign substance.
3. Quiet iritis is not infrequent.
4. Large flap gives the best chance of infiltration.
5. If conjunctival tissues are thick and infiltrated, it is better to suture the flap.
6. When the flap is dissected to cornea, it is better to use a cotton-wrapped applicator; this holds down the flap and keeps the field clear.
7. A *2mm* trephine is most satisfactory.

CURRAN.

PAUL (167, **Late infection after Elliot's trephining**) adds another case of this nature. The operation produced a good result that lasted for ten months, when panophthalmitis suddenly set in. Streptococci were found in the vitreous of the

enucleated eye. At one place of trephining, without iridectomy, there was no trace of cicatrization, but it was filled by a prolapse of the uvea so that a fistula was left between the cornea and iris. Here there was only a slight infiltration of small cells. The place of the other trephine opening, with iridectomy, was examined only partially, but it likewise appeared to be without cicatrization. The covering conjunctiva was perforated and infiltrated greatly with small cells. The latter were also found about the opening. Evidently this was the place of entrance of the infection.

BUDEK (157, **Two rare infections of the eye**) reports one case of infection nine months after Elliot's trephining. A plug of pus occupied the trephine opening and contained xerosis bacilli, while the bacillus mesentericus subtilis was obtained from the vitreous by aspiration. The result was chronic iridocyclitis with almost total loss of vision. The other case was one of infection after operation for detachment of the retina, by aspiration of the subretinal fluid and filling the vitreous with salt solution.

FAGE (159, **Hydrophthalmos**) does not like iridectomy because of the dangers of prolapse of the vitreous, luxation of the lens, and intraocular hemorrhage. Sclerotomy is simple and may be repeated many times. He has treated 14 cases in this way, and seen the enlargement of the eye arrested and normal tension in five. In many cases the formation of a cystoid cicatrix is particularly beneficial, and then Elliot's operation is indicated.

CAUSÉ.

LOEHLEIN (165, **Glaucoma and the general organism**) says that the increase of blood pressure is doubtless a factor in the production of glaucoma, but is by no means the only one. The fullness of the vessels, which may not change the pressure, must be taken into account, for an increase or a decrease of the ocular tension may result from a greater or less fullness of the vessels of the eye. For the dependence of glaucoma on the cardiovascular system there must be taken into account: (1) intraocular vascular changes; (2) increases of the blood pressure due to diseases of the heart, or of the vessels, especially of the kidneys; (3) obstructions to the venous flow; (4) abnormal distribution of the blood. Disturbances of the cardiovascular

system cannot be an essential cause of the origin of glaucoma; they can excite it only in an eye previously predisposed. The recent researches of Hertel concerning the molecular concentration of the blood are of greater importance to the ocular tension, as a reduction of the tension follows the introduction of hypertonic solutions into the circulation.

KUEMMELL (163, **Glaucoma and diseases of the cardiovascular system**) has studied seventy cases with regard to this connection. He finds that the blood pressure averages 20*mm* higher in glaucomatous persons than in others, 165.7*mm* of mercury instead of 145.2. Increase of the blood pressure can be demonstrated in four fifths of the cases. In acute inflammatory glaucoma the average blood pressure of 14 cases was 177*mm*, almost the same in chronic, 175.2 in 18 cases, 160.6*mm* in hemorrhagic, while in the simple it was only 153.3*mm*. An acute or subacute glaucoma without increase of the blood pressure arouses suspicion of an atypical condition. A thorough general examination of the cases without increased blood pressure revealed other signs of disease of the cardiovascular and renal systems in all but four. These included organic and functional heart troubles, sclerotic and vasomotor vascular disturbances, and changes in the function of the kidneys. These changes evidently cannot produce glaucoma, but they play an important part in its ætiology.

HEERFORDT (161, **Glaucomatous congestion of the anterior ciliary vessels**) comes to the conclusion that arteries as well as veins may become dilated in glaucoma.

SCHIRMER.

BEHR (156, **Anatomical changes in the course of glaucoma**) reports two cases in which the glaucomatous excavation disappeared through the proliferation of newly formed tissue. In his first case there was a deep excavation extending to the margins in 1901; in 1913 it could not be seen because of opacity of the refractive media. Anatomical examination showed, together with other changes, an atrophy of the retina, which showed an approximately normal structure in a circle about the equator. The excavation of the papilla was filled with a glial tissue rich in nuclei, with numerous blood-vessels that projected above the level of the retina and overlay its neighboring parts. This tissue contained connected cysts. The lamina cribrosa

was driven back considerably. A similar condition was present in the second case, in which the glial mass corresponded in extent to a physiological papilla. Apparently the glial tissue comes from the surface of the excavated lamina cribrosa.

Contrary to Morax's view that it is doubtful if the operative treatment of glaucoma is any more successful now than formerly, SULZER (172, **Results of surgical treatment of glaucoma from its beginning to the present time**) concludes that the results to-day not only equal, but surpass, those of former times in the regulation of the tension and the preservation of the function of the eye, especially through the efforts to obtain a permanent filtration cicatrix. While formerly results showed a certain fluctuation, this was mainly due to the instillation of miotics, so that many cases came too late to be operated on. All statistics show that the earlier the operation is performed the better. The longer the disease has lasted the more uncertain is the prognosis: the result may be wonderfully good, or it may be bad.

CAUSÉ.

ISCHIKAWA (162, **Schnabel's caverns**) examined microscopically ten glaucomatous eyes and found Schnabel's caverns in five globes where the glaucoma was comparatively fresh. They were missing in five cases with absolute glaucoma for several years. It is a well-known fact that the caverns disappear in such old cases because the elements of the optic-nerve tissue get closer together. He upholds Schnabel's theory that the caverns are characteristic of glaucoma and form a specific form of optic-nerve disease. They begin as an œdema of the nerve fibers, and these become dissolved later, thus forming caverns. The glaucomatous excavation is due to the collapse of these caverns. They are not to be found in other diseases, except in high myopia, when they are probably due to mechanical factors.

SCHIRMER.

In myopic individuals who complain of a considerable decrease of vision, ROLANDI (171, **High myopia and glaucoma**) says that attention should be directed to the condition of the staphyloma and the course of the retinal vessels, in case the changes in the fundus do not appear to be sufficient to explain the reduction, and when the papilla has a normal appearance.

If glaucoma is suspected, a careful regular investigation of the tension should be instituted with the tonometer, by which transient increases may be perceived.

CALDERARO.

LAGRANGE (164, **To elevate the tension**) recommends in order to elevate the tension of hypotonic eyes a cauterization at the filtration angle after the conjunctiva has been dissected up. By this a proliferation of firm cicatricial tissue is produced that closes the filtration angle, increases the tension, and so improves the nutrition of the eye. He has done this in cases of subnormal tension with detachment of the retina, and has cured the detachment in two cases. He thinks it indicated in persons with malignant myopia.

CAUSÉ.

XIX.—SYMPATHETIC OPHTHALMIA.

174. ELSCHNIG. **Refractometric investigations on the sympathetic transmission of irritation.** *Arch. f. Ophthalm.*, lxxxviii., 2, p. 392.

175. HIPPEL. **Abderhalden's dialysis experiment.** *Congress of Internal Medicine*, Wiesbaden, April 20 to 24.

176. MELLER. **On cases of sympathetic ophthalmia without characteristic changes in the primary eye.** *Arch. f. Ophthalm.*, lxxxviii., 2, p. 282.

HIPPEL (175, **Abderhalden's dialysis experiment**) comes to the conclusion, from his researches, that the danger of an impending sympathetic ophthalmia cannot be serologically determined.

Fuchs has claimed that the anatomical changes in the first eye are characteristic of sympathetic ophthalmia, and are found in this disease only. We can diagnose, therefore, an inflammation as a sympathetic one from the microscopical examination of the first eye. MELLER (176, **Cases of sympathetic ophthalmia without characteristic changes in the primary eye**) reports several cases in which the anatomical findings were not characteristic and tries to reconcile this fact with Fuchs's theory. The first two cases show a purulent inflammation, endophthalmitis septica. There are to be found, however, plenty of mononucleated cells, partly lymphocytes, mostly larger cells, which have a tendency to form nodules. He claims that such cells are never found in endophthalmitis, and that their presence proves the coexistence of endophthalmitis and sympathizing ophthalmia in these eyes.

In two other cases where the inflammation of the second eye did not show the characteristics of a sympathetic ophthalmia, the anatomical findings in the first eye, blind for several years after perforating ulcer or injury, corroborated the diagnosis of not sympathetic ophthalmia. The removed globes showed the consequences of an endophthalmitis that passed away years ago.

The last three cases belong, according to Meller, to the initial stage of the sympathizing inflammation. Small nodules were found in different parts of the uvea; some of them contained epithelioid cells. Endophthalmitis was present at the same time in two of these cases and had caused exudation; in the third the exudation was absent.

SCHIRMER.

Wessely has proved by his well-known experiments that no irritation of a rabbit's eye, whatever its intensity or duration may be, is capable of raising the percentage of albumin in the aqueous of the other eye. He concluded that it is impossible to influence one eye from the other. ELSCHNIG (174, **Refractometric investigations on the sympathetic transmission of irritation**) has repeated the same experiments, but using for the albumin test the refractive index of the aqueous instead of the precipitation test. He claims that his method gives more exact results, although the refractive index is influenced not by the albumin alone, but also to a slight extent by the salts. He arrives at the same results and conclusions as Wessely.

SCHIRMER.

XX.—RETINA.

177. AUBINEAU, E. **Retinal asthenopia.** *Arch. d'ophtalm.*, xxxiv., p. 264.

178. HARMS, C. **Unusual fundus conditions in juveniles.** *Arch. f. Ophthalm.*, lxxxvii., 3, p. 457.

179. LINDNER. **Pigmented striæ of the retina.** *Ibid.*, lxxxviii., 2, p. 230.

180. LINDNER. **A case of hemeralopia with whitish gray fundus.** *Ibid.*, lxxxviii., 2, p. 230.

181. TIFFANY, FLAVEL B. **New procedure for the cure of retinal detachment.** *Arch. d'ophtalmologie*, xxxiv., p. 373.

In continuation of his reports of rare cases of diseases of the retinal vessels HARMS (178, **Unusual fundus conditions in**

juveniles) gives full histories of the following cases: (1) Juvenile periphlebitis retinalis; (2) multiple retinal hemorrhages; (3) formation of retrovascular fibrous and pigmented streaks in a case of cyanosis of the retina; (4) circumscribed hemorrhagic detachment of the retina, or formation of intraretinal blood cysts. SCHIRMER.

LINDNER (179, **Pigmented striæ in the retina**) describes five typical and three atypical cases of this rare condition, which is known in English literature as angioid streaks. Starting from a ring around the disk a number of irregular streaks are to be found radiating in the fundus toward the periphery. They frequently are crossed by the retinal vessels and invariably are situated behind the same. Their caliber is changing constantly, their color varies from red to brown or gray. Frequently hemorrhages are found. The vision was satisfactory in the majority of cases, and the disease was discovered when the patient was examined for some other reason.

Lindner thinks that the disease is due to capillary hemorrhages in the deeper layers of the retina around the disk. The blood finds the least resistance toward the periphery and therefore is advancing in this direction.

Pigmented streaks which resemble somewhat these angioid streaks are sometimes found after operative detachment of the choroid. SCHIRMER.

LINDNER (180, **Hemeralopia with whitish gray fundus**) adds to the seven cases contained in literature a new observation. The patient, a Jewish boy of 16, is the only living child of parents who are second cousins. Not an albino. Vision very poor, field normal. Hemeralopia present from early childhood. This disease, which was described first by Dor in 1883, later by Oguchi, is closely related to retinitis punctata albescens, and retinitis pigmentosa. SCHIRMER.

AUBINEAU (177, **Retinal asthenopia**) says that he has seen seventy-four patients with asthenopia due to the rapid fatigue of the retina. He excluded, naturally, the cases with muscular imbalance, or with trouble of the accommodation. The paper brings out nothing that has not been known since the publications of Agnew, DeWecker, Meyer, and Abadie.

SCHOENBERG.

TIFFANY (181, **New procedure for the cure of retinal de-**

tachment) trephines, after Elliot's method, a portion of the sclera in the center of the area corresponding to the retinal detachment, and then excises the choroid that prolapses into the scleral opening. He considers his operation on one patient successful, who was seen one week afterward with the retina replaced. SCHOENBERG.

XXI.—OPTIC NERVE AND VISUAL TRACT.

182. CALHOUN, F. P. **Pseudo-optic neuritis.** *Ophthalmic Record*, May, 1914.

183. DUTOIT, A. **Neurotropic action of lipoiodine in optic neuritis.** *La clinique ophtalm.*, xx., p. 207.

184. PRICE, G. E. **A case of Tay-Sachs amaurotic idiocy with a positive Wassermann reaction.** *Jour. A. M. A.*, May 16, 1914.

185. RENTZ. **Choked disk.** *Klin. Monatsbl. f. Augenheilk.*, lii., p. 531.

186. TSCHIRKOWSKY. **Diseases of the optic nerve in multiple sclerosis.** *Zeitschrift f. Augenheilkunde*, xxxi., p. 451.

CALHOUN (182, **Pseudo-optic neuritis**) observed the case of a woman aged 43, who consulted him on account of severe headaches. The margins of the disks were blurred and obliterated by slight swelling. The vessels were normal, but lost in the swelling at the edge of the nerve. The fields were normal for form, but there were slight irregularities for colors. The Wassermann reaction was negative. An examination two years later disclosed no material change in the findings and the headaches had disappeared. ALLING.

RENTZ (185, **Choked disk**) discusses 220 cases of choked disk, neuritic atrophy, and optic neuritis. The ætiology in 180 cases of double choked disk was: cerebral tumor in 72.2%; cerebral syphilis in 10%; cerebral tuberculosis in 4.2%; deformity of the skull in 3.9%; hydrocephalus in 3.3%; abscess of the brain, chronic nephritis, anæmia, lead poisoning, and fracture of the base of the skull, each in 0.6%; cysticercus of the brain in 1.2%. In 18 monolateral choked disks it was cerebral tumor in 33%; tuberculosis of the brain, multiple sclerosis, chronic nephritis, and disease of the accessory sinuses, each in 0.06%; disease of the orbit in 0.48%. The situation of the cerebral tumor was located in thirty-two: the frontal lobes in six, the parietal lobes in one, the parietal lobe and pons in one, the central convolutions in four, the temporal lobes in three, the temporal and occipital lobes in one, the occipital lobes in two,

the corpus callosum in one, the thalamus opticus in one, the third ventricle in two, the base of the brain in two, the hypophysis in one, the angle between the cerebellum and the pons in five, the cerebellum in two. In nine cases of monolateral choked disk autopsy showed the tumor to be on the same side in five, on the opposite side in four. The visual field in choked disk due to tumor was free in eight, the blind spot was enlarged in thirty-three, a central scotoma was present in one, a central scotoma and concentric contraction in one, concentric contraction in forty-three, partial peripheral contraction in twelve, and hemianopsia in nine.

TSCHIRKOWSKY (186, **Diseases of the optic nerve in multiple sclerosis**) had a case of multiple sclerosis that presented bilateral papillitis. He considers the cause of the œdema of the papilla to be an obstruction to the circulation of the blood and lymph by extensive sclerotic plates in both nerve trunks.

DUTOIT (183, **Neurotropic action of lipoiodine in optic neuritis**) recommends highly the use of lipoiodine for the treatment of any affection of the optic nerve or retina, no matter what its origin may be. Lipoiodine is an organic compound of iodine and is, according to the author, much superior in its action to the iodides commonly used, not only on account of its greater affinity for the nervous elements of the visual organ, especially the optic nerve and retina, but also because of its cumulative effect. In support of his assertions the author reports the histories of four patients with optic neuritis and partial atrophy in whom he obtained a marked improvement by the aid of lipoiodine. SCHOENBERG.

PRICE (184, **Tay-Sachs amaurotic idiocy**) thinks that the lack of certain knowledge regarding the ætiology of this disease, the varied opinions expressed, the character of the pathological findings, and the positive Wassermann in his case, should be sufficient ground to reopen the argument that hereditary syphilis is the cause. ALLING.

XXII.—ACCIDENTS, INJURIES, FOREIGN BODIES, PARASITES.

187. BAILLART. **Interstitial keratitis and traumatism.** *Annales d'ocul.*, cli., p. 452.

188. BALLANTYNE, A. J. **Alternating hyphæma: an unusual result of concussion of the eyeball.** *Ophthalmoscope*, June, 1914, p. 322.

189. BAUDRY. **Contribution to the medico-legal study of traumatic paralyses of the muscles of the eye.** *La clinique ophtalm.*, xx., p. 83.

190. CLEGG, J. G. **A case of death following open evisceration.** *Ophthalmoscope*, June, 1914, p. 337.

191. CONTINO. **Injuries of the ciliary body. Clinical and pathological study.** *La clinica oculistico*, September–October, 1913.

192. HAAS, E. **Action of a piece of indelible pencil on the conjunctiva and cornea.** *Arch. d'ophtalm.*, xxxiv., p. 299.

193. LEBER. **Filarial diseases of the South Sea.** *Arch. f. Ophthalm.*, lxxxvii., 3, p. 541.

194. MARBAIX. **Injuries of the eye during ball playing.** *La clinique ophtalm.*, xx., p. 285.

195. MASCHLER. **Shot wound of the sclera.** *Klin. Monatsbl. f. Augenheilk.*, March–April, p. 537.

196. NATANSON. **Two cases of operation for cysticercus.** *Zeitschrift Augenheilkunde*, April–May, p. 454.

197. PASCHEFF, C. **The violet eye from chemical pencils.** *Ann. d'ocul.*, cli., p. 430.

198. POLLIOT, H. **An obstetrical enucleation.** *La clinique ophtalm.*, xx., p. 296.

199. TERRIEN, F., and PRELAT, P. **A case of subconjunctival filaria loa.** *Arch. d'ophtalm.*, xxxiv., p. 294.

POLLIOT (198, **An obstetrical enucleation**) relates the unique case of a midwife who delivered a primipara of an infant with one eye enucleated. The accident was produced by persistent attempts on the part of the midwife to make sure whether it was a breech presentation, and by repeatedly introducing her index finger into the orbit of the infant under the impression that it was the anus. SCHOENBERG.

HAAS (192, **Action of a piece of indelible pencil on the conjunctiva and cornea**) removed a piece of indelible pencil which got into the conjunctival sac of a young student two hours before, while he was sharpening the pencil. Three days after the accident a number of small ulcerations appeared on the margin of the cornea. The ulcerations repaired within twenty-four hours, but others appeared elsewhere, at the limbus. After a few days, several whitish lines appeared in the substantia propria of the cornea and lasted for about fifteen days, when they disappeared entirely. An intense photophobia persisted for about one month after the ulcerative process in the cornea had completely subsided. The severity of the process following the accident, apparently insignificant at beginning, should be a warning for the physician who has to

give a certificate. The chemical examination of the piece of pencil showed it to consist of a vehicle, an inert substance (argillum), and a dye, rosaniline hexamethyl, which—as it is known—is a basic dye with great histologic affinity for the cellular nuclei. This sufficiently explains the necrotic action of the indelible pencil upon the external membranes of the eye of the author's patient. SCHOENBERG.

PASCHEFF (197, **The violet eye from chemical pencils**) reports the cases of two young patients with violet discoloration of the conjunctiva of one eye from the accidental introduction of a piece of violet pencil into the conjunctival sac. Washing out of the conjunctiva was sufficient to remove the stain in twenty-four hours. No ill after-effects were produced. SCHOENBERG.

BALLANTYNE (188, **Alternating hyphæma: an unusual result of concussion of the eyeball**) describes a case of trauma to the eye in which the blood in the anterior chamber disappeared on accommodation and returned, sometimes greater in amount, on relaxation of accommodation. The size of the hyphæma was unaltered by pressure on the eyeball. If the patient lay on the right or left side, the blood could be made to occupy the temporal or nasal angle of the anterior chamber, but on accommodation it always drifted towards the inferior angle Ballantyne is of the opinion that the ciliary body was separated from its scleral attachments at the inferior angle of the anterior chamber, thus allowing communication between the chamber and the suprachoroidal space, and that the alteration in size of the hyphæma was due to suction brought about by contraction of the ciliary muscle. CURRAN.

MARBAIX (194, **Injuries of the eye during ball playing**) has seen a number of traumatic lesions of the eye sustained by the Belgian college boys while playing ball. The most serious conditions were produced by balls that were so small that they struck the eye without hitting the margins of the orbit. He recommends that these balls be discarded in favor of larger ones. SCHOENBERG.

In order to establish a relation between a traumatism and an interstitial keratitis it is necessary, according to BAILLART (187, **Interstitial keratitis and traumatism**), that be the accident confirmed by an ophthalmologist, that a slight inflammatory

irritation of the eye be present in the days following, and that after an interval of at least ten to fifteen days the keratitis appears in its characteristic way. Disease of the second eye excites doubt as to its traumatic character, but does not suffice to exclude it when both of the other conditions are fulfilled. In the appraisement of the indemnity the impairment of the second eye is to be excluded, as the condition is one of a general disease that has been localized by the injury. CAUSÉ.

BAUDRY (189, **Traumatic paralyses of the muscles of the eye**) describes first the pareses caused by fracture of the base of the skull, in which the ocular nerves are almost always involved because of their situation. As a rule they may be observed immediately after the accident, but they may appear later, and are then caused by the hemorrhage. Paresis of the abducens is the most common because of its exposed position on the apex of the petrous portion of the temporal bone, the favorite place for fractures of the base. Isolated nuclear paralyses of the externus are met with only exceptionally. Pareses of the oculomotorius from fracture of the anterior part of the base of the skull are more rare, and are generally complicated with changes in the optic nerve on account of the position of the two nerves. The complication of a total ophthalmoplegia with an arteriovenous aneurysm after rupture of the internal carotid into the cavernous sinus is characteristic. Traumatic pareses after wounds of the orbit or face, caused by traumatism to the nerves, muscles, or tendons, are more common than is generally thought. They may be produced directly by the penetration of an object into the orbital cavity, or indirectly by a contusion of the region of the orbit, with or without fracture of one of the bones. The oculomotor nerve is the one mostly affected, and one may often see partial pareses of single branches; total ophthalmoplegia is seen only exceptionally after very severe traumatisms, by which the eye is frequently sacrificed. The prognosis of pareses of the ocular muscles is generally good, except when they are caused by direct laceration, or meningeal inflammation. The indemnity should be calculated according to the paresis of the affected muscle and the occupation of the patient. Diplopia and loss of stereoscopic vision, with their accompanying symptoms, are as bad in certain callings, at least for a time, as the complete loss

of an eye. Persistent diplopia may very often be compensated by the position of the head or by correction with prisms, yet even then there is always a certain amount of impairment of the wage-earning ability, which may be estimated at from 5 to 15%. The common traumatic mydriasis with paresis of the accommodation after contusions usually lasts a long time and is a particularly serious disturbance in occupations requiring hard near work, and may be estimated at from 10 to 15%. If it necessitates the exclusion of one eye the earning capacity is lessened 25 to 30%. CAUSÉ.

CONTIÑO (191, **Injuries of the ciliary body**) reports three cases of shot wound of the ciliary body. He says that in thirty-four cases observed by him the foreign body did not penetrate the eyeball in twenty-two, but did in twelve. Twenty-seven of the patients were adults, four of them women, seven were children. Injuries of the ciliary body without penetration are the more frequent among workmen and playing boys. The diagnosis is rarely difficult if one makes a careful examination of the seat of the injury, its form and direction, and ascertains whether there is an intraocular hemorrhage. If a foreign body penetrates the ciliary body and is invisible, its location may be determined by the tenderness on palpation of the injured region, and this means may be supplemented by the sideroscope and the X-rays. If an injury of the ciliary body is complicated by penetration, or the presence of a foreign body that cannot be removed, inflammation commonly appears which leads not only to loss of vision, but to loss of the eye itself with danger of sympathetic ophthalmia. Atrophy of a wounded eye is often the result of a wound of the ciliary body. If a plastic cyclitis sets in, phthisis bulbi will result. Sympathetic ophthalmia may be excited by any injury whatever of the ciliary body. If an eye that has become atrophic as the result of a wound becomes inflamed, a sympathetic inflammation may set in, no matter how long back the traumatism may date. The conditions productive of sympathetic ophthalmia appear with greater frequency in eyes that have suffered from penetrating wounds of the sclera and cornea with involvement of the iris and ciliary body, or the entrance of a foreign body. Contino is of the opinion that a primary healing of a wound of the ciliary body is impossible because of

the gaping of its margins caused by the retraction of the ciliary muscle, as well as the participation of the vitreous and ciliary processes, and also because the reparative material is secreted only by the episclera while the ciliary epithelium of the retina is incapable of proliferation so as to cover the inner surface of the cicatrix. Treatment consists of suturing the margins of the wound in the conjunctiva after excising any prolapse of vitreous that may be present. When there is danger of a considerable escape of vitreous the sclera should be sutured. Any prolapse of iris or of the ciliary body should be abscised.

CALDERARO.

MASCHIER (195, **Shot wound**) saw a wound made by a bullet from a Flobert rifle that rebounded from its target. There was no wound of the upper lid, but one as large as a pea internal to the limbus, a large intraocular hemorrhage, and good tension of the eye. The bullet lay behind the orbit in the middle fossa of the skull, having passed probably through the superior orbital fissure.

TERRIEN and PRELAT (199, **A case of filaria loa**) report a case of filaria found under the conjunctiva of one eye. The patient had lived for ten years in Congo and had felt several times that something was moving about in his eyeball. The examination of his eye revealed a subconjunctival cyst in which a little worm could be seen moving. Prof. Blanchard examined it and pronounced it as a filaria loa. The manner of entrance is not known. The authors think that the parasite may be introduced into the system by the bite of a fly, glossina palpalis, frequently met with in Africa.

SCHOENBERG.

LEBER (193, **Filarial diseases**) says that diseases due to different kinds of filaria are common in Samoa. In the eyes, microfilaria are mostly found. They occur mainly in the lids, or in the conjunctiva, where they cause œdema and inflammation that last for a few days. The occurrence of filaria inside of the eyeball is more important. They are found in the vessels of the retina and of the choroid, where they obstruct the entire vessel. The consequence for the vision depends on their location. Hemorrhages are frequent.

SCHIRMER.

NATANSON (196, **Cysticercus**) reports two cases of cysticercus removed through a horizontal incision in the sclera. One was subretinal in the region of the macula, the other outward from the macula.

CLEGG (190, **Death after evisceration**) reports a case in which open evisceration was selected as the safest method in a case of panophthalmitis. The patient died, and autopsy showed that the infection reached the meninges through the optic nerve and produced a purulent meningitis.

CURRAN.

BOOK REVIEWS.

I.—Jess. **Die sympatische Ophthalmie.** (Sympathetic Ophthalmia.) Sammlung zwangloser Abhandlungen aus dem Gebiete der Augenheilkunde. Halle a. S. 1914.

Jess gives a comprehensive report on our present knowledge of sympathetic ophthalmia. This disease since it was first described by Mackenzie in 1835 has attracted the keen interest of a great number of oculists. Its origin, however, is still in the dark, and its therapy is unsatisfactory notwithstanding the painstaking work of a great number of scientists.

The first thirteen pages of Jess's booklet are devoted to the description of the various forms of the clinical appearance of this disease. The author follows closely the description which Schirmer gave eighteen years ago in the Handbuch of Graefe-Saemisch.

We have to differentiate absolutely between sympathetic irritation and sympathetic inflammation. The old idea that the former is a preliminary stage of the latter is entirely erroneous. The clinical picture of sympathetic irritation is very manifold. It consists in an abnormal irritability of the sympathizing eye, combined with lowered efficiency, and is caused, according to general opinion, by irritation of the centripetal nerves of the exciting eye which is transmitted to the nervous apparatus of the sympathizing eye.

Two points are essential for the diagnosis of sympathetic irritation: the second eye must not show any anatomical changes except for a slight conjunctival or episcleral hyperæmia; and the enucleation of the exciting eye must cure the affection of the other eye entirely and instantaneously.

Sympathetic irritation may consist of pain in the second eye or in the head on the non-affected side. Strong light is

especially liable to produce this symptom, as photophobia is one of the most frequent symptoms.

Many cases of amblyopia sympathica have been described; very few, however, deserve this name. Some of them were due to retrobulbar optic-nerve affections, little known in former times; in other cases the amblyopia was simulated. Much more frequent is the asthenopia sympathica, *i.e.*, diminished endurance of the eye when the patients try to read or to work; this may be caused by a weakened condition of the retina—asthenopia retinalis—or of the ciliary muscle—asthenopia accommodativa. The symptoms are exactly the same as are found sometimes in both normal eyes of a neurasthenic patient. The secretory apparatus may become involved by hypersecretion of the lacrimal gland. A sympathetic glaucoma, however, due to intraocular hypersecretion does not exist.

This sympathetic irritation can be caused not only by serious inflammation of the eye; every slight injury to the cornea, foreign body in the conjunctival sac, in short, every affection that irritates the sensitive ciliary nerves, is capable of producing irritation in the second eye.

Recovery or enucleation of the exciting eye cures the sympathetic irritation with certainty and instantaneously.

Sympathetic inflammation is characterized by the presence of organic changes in the tissues of the eyeball, mostly in the uvea. It is not influenced by the removal of the exciting eye. It occurs after injuries or operations of one eye which do not heal normally but are followed by a chronic iridocyclitis. In exceptional cases intraocular tumors may produce sympathetic inflammation.

Sympathetic papillo-retinitis has been described by Schirmer as a true sympathetic inflammation. It resembles however sympathetic irritation, in as much as it is cured with certainty by the enucleation of the injured eye. It is probably due to the action of toxins produced by the microörganisms in the first eye.

The anatomical changes differ entirely from those found in purulent inflammation. Fuchs claims that they are so characteristic as to permit the diagnosis of its sympathetic nature.

In regard to the etiology our uncertainty has grown in recent years. Ten years ago it seemed to be a well-established

fact that sympathetic ophthalmia was caused by micro-organisms which migrate from the exciting to the sympathizing eye. This belief was not shaken by the fact that all endeavors to find this microörganism have failed.

There are other diseases of a doubtless microbic origin where the microörganism can not be demonstrated. This gap has not been filled in recent years. Deutschmann claims to have found a diplococcus in the exciting eyes and to have produced uveitis experimentally with the same. It appears doubtful, however, whether these results are reliable or are due to faulty technique.

Lately Elschnig has published a series of articles in order to prove the anaphylactic origin of sympathetic inflammation. He assumes that the absorption of injured uveal tissue of the first eye sensitizes the organism and especially the homologous organ, the other uvea. In this sensitized tissue the entrance of the anaphylactic substance, uvea in small quantity, will produce severe inflammation. The decay of even one uveal cell in the second eye will be capable of producing sympathetic inflammation. It seemed necessary to Elschnig, in order to explain the decay of uveal cells in the second eye, to form a second hypothesis. He assumes that there must be some physical anomaly or autointoxication to bring about the first changes in the uvea of the second eye.

This theory suggests somewhat Schmidt-Rimpler's modified ciliary-nerve theory. It explains some of the clinical facts better than the old theories; there are quite some difficulties left.

Elschnig has succeeded in sensitizing the organism from the eye and in producing anaphylactic uveitis by reinjection into the same eye. He could not produce an inflammation of the second eye by these means. It has been proven furthermore by several authors that the microscopical pictures in sympathetic and in anaphylactic uveitis are different.

It is impossible therefore to accept Elschnig's hypothesis of the anaphylactic nature of the sympathetic ophthalmia as a well-established theory. SCHIRMER.

II.—**Die Anaphylaxie in der Augenheilkunde.** (Anaphylaxis in Ophthalmology.) By Prof. Dr. AUREL v. SZILY (Freiburg i.

Br.) and Dr. U. ARISAWA (Osaka), experimental collaborator. With 4 illustrations, 10 colored and 3 not colored plates. Preface by Professor Dr. TH. AXENFELD (Freiburg i. Br.), pp. 317. Stuttgart: FERDINAND ENCKE, 1914.

The question of anaphylaxis has, during the past few years, attracted the close attention of physiologists and clinicians alike, and a considerable number of papers on experimental researches and clinical observations has been published in various countries. Anaphylaxis has been recognized as a truth of a broad and general meaning, interesting every branch and specialty of medical science.

Among others, ophthalmologists were not tardy to recognize the great importance the theory of anaphylaxis may have upon their own special field, and during the last three to four years numerous attempts have been made to bring forth experimental and clinical proofs regarding the relation between general and ocular anaphylaxis. These papers have appeared, scattered in various medical journals, and Professor v. Szily, one of the foremost workers in this field, has had the happy idea of issuing in book form the results of his own arduous and extensive investigations, as well of all other authors. The book should be read by every progressive ophthalmologist. It contains a wealth of material, even the outlines of which could not be reproduced in the space allotted to this review. It is not our intention to summarize the hundreds of experiments upon which are based the principles and conclusions enunciated in this monograph. We shall only make a short mention of the most salient points.

The book is divided in two, a general and a special part. In the first part, the author gives in 58 pages, the history, definition, and the fundamental principles of anaphylaxis and the technical procedures used by various authors for their experimental work. The ground is pretty well covered, and the reader who intends to familiarize himself with the general principles of anaphylaxis can nowhere read a better exposition.

From the reviewer's point of view and, strange to say, one of the debatable points in the first part of the monograph, is the definition of anaphylaxis. v. Szily's definition of anaphylaxis is as follows: A condition in which an organism has become hypersensitive to an antigen with which it has been

previously treated. A certain time (period of incubation) must elapse before the organism becomes hypersensitive. No lesser authorities than v. Pirquet and Schieck, who use the term of "Allergie" instead of anaphylaxis, give a similar hazy, though broader definition of this condition. It would have been much better if Ch. Richet's original conception could have been adopted and possibly amplified in v. Szily's excellent work.

Anaphylaxis is not a state of hypersensibility or of increased ability to react to albumin foreign to the organism, as so many authors believe, but it is the well-defined clinical condition which results when an organism is repeatedly submitted to the action of a foreign albumin. It is not a latent or potential state, as the word "hypersensitiveness" implies; it is a symptom complex, or rather a disease, and it is important for the reader to have a clear idea of the meaning of anaphylaxis before he goes any further.

v. Szily's description of the two types of anaphylactic reaction, the general and local anaphylaxis, is complete and very accurate. Of these two types, the local anaphylaxis, or phenomenon of Arthus, is the one of great interest to ophthalmologists. Horse serum injected a few times at regular intervals under the skin of a rabbit will be promptly absorbed. After the 6th or 7th injection, it will produce a severe inflammation and abscess. A similar local reaction is noticed when horse serum is repeatedly injected into the parenchyma of the cornea of a rabbit. These are instances of local anaphylaxis, and the discovery of this type of reaction has served as foundation to the research work which has been done on ocular anaphylaxis. It has opened up a field full of possibilities and has thrown a new light on such problems as sympathetic ophthalmia and parenchymatous keratitis.

Further on, the author describes in detail, the methods and substances used for sensitization, the period of incubation, and the various results obtainable in various species of animals. The minute description of the methods of obtaining extracts of the various tissues of the eyeball, with their antigenic and toxic effects occupies an important part of an entire chapter on antigens. The introduction of an antigen into the body, parenterally,—that means not by the digestive route—pro-

vokes the production of antibodies. v. Szily discusses the various theories advanced for the explanation of the production of anaphylaxis and leans toward Friedberger's theory that it is due to the action of a substance resulting from the combination in the organism of the antigen, antibody, and complement. Vaughan's theory on anaphylaxis is not discussed, but Schittenhelm's interpretation of this condition by Abderhalden's defense-ferment ("Abwehr-fermente") theory is given more than due consideration.

After the pure theoretical part, v. Szily describes the symptomatology of anaphylactic shock and the post-mortem findings in guinea-pigs and rabbits and reproduces the views of v. Pirquet and Schieck on manifestations of general anaphylaxis (exanthem and fever) in human beings.

Referring to the important work of Friedberger and his coworkers, the author goes elaborately into the discussion of the intimate relation between the evolution of infectious diseases, immunity and anaphylaxis. He expresses his adherence to the generally accepted idea that bacteria act upon the organism, not only by their toxins, but also by the antigenic action of their own dead bodies which, under certain circumstances, may produce anaphylaxis.

The reader will realize how interesting this part must be to the ophthalmologist, who has frequently to contend with recurrent infectious processes in the eye. These recurrences may be explained by an anaphylactic condition of certain tissues in this organ.

The second chapter deals with the technic of injections in the eyeball (cornea, anterior chambers, and vitreous), the method of obtaining anaphylatoxins, and of making various organ emulsions and extracts, the Weichard's epiphanin reaction and Abderhalden's test, and their application to the detection of anaphylatoxins in the blood and tissues.

The special part of the monograph contains the study of anaphylaxis in relation to ophthalmology. v. Szily devotes a good deal of space to the question regarding the existence of anaphylactic conditions in the eye and builds up the foundation to this problem by a very extensive critical review of all that has been published on the subject. After he discusses the studies on the toxicity of extracts from various organs of the

animal body, and especially from the various parts of the eye (cornea, ciliary body, lens, retina, vitreous), he reproduces in detail all the experimental work of Uhlenhut, Kraus, Dörr, Krusius, Römer, Gebb, and many others on the production of general and ocular anaphylaxis by the use of extracts from tissues of the eyeball. Among the various parts of the eye, the lens has been more extensively used as an antigen and for the production of anaphylaxis. A very interesting and far-reaching point brought out by these workers was, that the lens matter possesses an entirely different kind of antigenic specificity than the blood serum. Experiments have shown that anaphylaxis may be produced by using lenses from one species for the first injection and from a different species for the subsequent injections, while, on the other hand, when serum is utilized for the production of anaphylaxis, it must always be from the same species. The lens matter is called "Organ specifisch," while the serum is "Art specifisch" (species-specific). Krusius believes to have discovered anaphylactic symptoms in an animal by first doing a discission of the lens in one eye and then, after a certain time, in the other eye. The reader will realize the possible importance of the question involved. If it is possible that lens matter, which remains after a cataract operation, acts like an antigen and sensitizes the body against its own lens matter, then it is equally possible that the absorption of lens matter after the second cataract operation produces anaphylactic symptoms in human beings. So far, Krusius' work has been contradicted by the findings of a number of other workers. Neither does our clinical experience speak in favor of such a theory.

After this preliminary study of the toxicity and antigenic qualities of organ extracts, the author enters into the discussion of local anaphylaxis in the eye. Repeated injections of a foreign albumin in the cornea, vitreous, under the conjunctiva, etc., produce, besides general anaphylaxis, local disturbance of an anaphylactic nature. Various serums, organ extracts, and also extracts from various tissues of the eyes, mainly uvea, cornea, vitreous, retina, have been used as antigens, in all possible combinations. The antigen was first injected into the peritoneum, the blood, or subcutaneously, and then, after the usual period of incubation, into the eyes, or *vice versa*, or

both injections were made in the eyes. The account of a very long series of experiments along this line concludes that the eye may react in a manner characteristic of local anaphylaxis when it has been sensitized by repeated local or distant application of an antigen. It is to the credit of the author that Wessely's pioneer work on corneal anaphylaxis with the classical drawings illustrating the subject are faithfully reproduced.

One of the most interesting chapters in v. Szily's monograph is undoubtedly Chapter 9, dealing with the conception of sympathetic ophthalmia as an anaphylactic uveitis. This question is the logical outcome of the numerous researches, painstakingly and carefully laid out in the previous eight chapters of the monograph.

The author superfluously, but very ably, reviews the various theories on sympathetic ophthalmia advanced until the anaphylactic era and finally gives a summary of the views of Elschnig and Kümmel on this subject. These authors have lately done a great deal of experimental work on ocular anaphylaxis and have put forward a number of experimental and clinical "proofs" tending to show that sympathetic ophthalmia is due to an anaphylactic reaction in the uvea of both eyes. According to these authors, the uveal pigment enters the circulation, under certain circumstances (injury, disease) and sensitizes the uvea of both eyes. They also add that a preexisting disturbance of the general nutrition is necessary so that the uvea should be in a receptive mood for hypersensitization. The reaction after this repeated sensitization by the uveal pigment is an anaphylactic phenomenon and constitutes sympathetic ophthalmia.

v. Szily reviews the researches of Weichardt, Wissman, Gradle, which seem to support Elschnig's theory, and those of Hess, Roemer, Meller, Fuchs Jr., Dold, Rados, v. Hippel, and Brock, which bring forward serious objections based on experimental as well as on clinical data. The discussion of the entire subject, in view of the heated opposition Elschnig's views have encountered, is fair, impartial, and very instructive. Of equal merit is the author's exposition of the conception of parenchymatous keratitis as an anaphylactic condition. Since Wessely has been able to reproduce in rabbits, by the anaphylactic

method, a condition in appearance very much similar to the human parenchymatous keratitis, the term anaphylaxis has frequently been used in the discussion on the nature of this disease. v. Szily and Arisawa have verified by numerous experiments all the findings of Wessely. On the strength of these experiments and considering the clinical evolution of parenchymatous keratitis, Elschnig and Igersheimer have come to the conclusion that this disease is of anaphylactic nature, produced by the repeated sensitization of the cornea by the products of metabolism of the spirocheta pallida.

Finally the author reviews Römer's theory of the etiology of senile cataract. The nucleus of this theory is that there must be in the organism and mostly in the blood of cataract patients substances which act injuriously on their lens. Römer has tried all methods of examination he could think of to prove the existence of these lens-injuring substances. Among other methods, Römer and Gebb used anaphylaxis and found that blood serum from cataract patients, mixed with lens albumin and injected repeatedly into guinea-pigs, produces a typical anaphylactic drop in the temperature of the animal in about 30% of the number of animals tested. This conclusion could not be confirmed by v. Szily, who made numerous experiments and obtained only negative results.

Römer also believes to have detected by Abderhalden's method the possible presence of specific ferments in the serum of cataract patients. Neither could this work be confirmed by v. Hippel's thorough researches.

We shall only mention the interesting chapter on hypersensibility to drugs, which in the opinion of the reviewer has nothing to do with anaphylaxis, and we pass to the last chapter on the pathological anatomy of anaphylaxis in inflammations of the eye.

This painstaking and interesting piece of work has been done by v. Szily in collaboration with Arisawa. They give detailed descriptions and illustrations of the microscopical and stained microscopical specimens of eyes with "anaphylactic keratitis" and "ophthalmia anaphylactica."

They describe three types of anaphylactic reaction in the cornea: parenchymatous, ulcerous, and necrotic.

Their description of the microscopic findings in parenchy-

matous keratitis has many points in common with that given by Elschnig of human corneæ with parenchymatous keratitis.

The anaphylactic reaction obtained in eyes of rabbits by the injection of extracts from uvea and lens matter into the vitreous is termed ophthalmia anaphylactica. They give a detailed description of the changes in such eyes at various stages and find much similarity with the picture of sympathetic ophthalmia. On the other hand, some of the most characteristic points of sympathetic ophthalmia are missing, and the authors justly refrain from confusing one condition with another. Apart from its scientific value the reviewer regards v. Szily's monograph as a document of great medico-historical interest. It illustrates how much preliminary work had to be done in order to make a path for the study of this intricate problem, and how progress makes its way from indefinite and hazy ideas to carefully laid-out researches. It is inspiring to see tireless attempts following one another in order to work out the great variety of problems involved in the study of anaphylaxis.

The author should be congratulated upon the way he has succeeded in making a more or less dry and complicated subject intensely interesting and easily readable. Occasional repetitions of the same kind of experiments, a tendency to theorize even when it could be avoided, and discussions on subjects not directly related to anaphylaxis are small errors upon which there is no necessity to insist.

SCHOENBERG.

III.—**Die Etiologie des Trachoms.** (Etiology of Trachoma.) By Prof. TH. AXENFELD, Freiburg, pp. 192. Published by FISCHER, Jena, 1914. Price 10 Marks.

The problem often apparently solved in the past is in reality to-day more confused than ever. The author attacks it from one angle only—that of a microbic causation. Does the affection represent a reaction toward a number of different irritants? Is trachoma a clinical unity? or is it merely a group disease? There is no doubt that certain mixed infections of the conjunctiva can set up a clinically perfect "trachoma." In such cases we may find gonococci, but much the most important factor is admixture with one or more other familiar

causes of conjunctivitis. Nevertheless, not one of these germs is known to be able outright to produce complete trachoma. At most where the latter is endemic such germs may cause suspicious cases.

Is there a pure acute trachoma of clinical significance? This point can be settled by inoculation or by study of fresh conjunctival catarrhs which become trachomatous. The acute case as a rule is due to mixture of infection and is rather rare. On the other hand, the so-called acute trachoma of the newly born child is very common, and it is in this form that the incidence of the "inclusion bodies" has been chiefly studied. These bodies will be taken up later. In regard to inoculation trachoma, the chief mystery relates to the frequent negative results. This subject has taken a great deal of explanation, and the main difference of opinion is whether the secretion or the solid fragments of tissue convey the disease. Trachoma is not nearly so contagious as Koch–Weeks or diplobacillus conjunctivitis. The problem is, then, Do the follicles of trachoma contain the contagion, and is trachoma a disease which may not involve a folliculosis? Granting that follicles are invariably present in inoculable trachoma, do these exhibit any special type? Again is there a follicular trachoma which is not contagious?

These problems have been studied extensively and appear to be very difficult of solution. Granular trachoma may occur in every degree of severity, affecting on the one hand the size and number of the granules, and on the other the degree of inflammation present. The cure of the affection may also show great variability.

Is it ever benign? Research evidently points throughout to the question of an "inclusion body" on the one hand (which can behave in various ways) and clinical trachoma on the other. The study of either may be pursued indefinitely, without any semblance of parallelism. On the other hand there is abundant reason to believe that these bodies stand in some relationship to the contagion of trachoma. The subject may now be changed to that of the natural and acquired immunity to trachoma as first shown by Swan Burnett in connection with negroes, who show some immunity; while the American Indians exhibit notable predisposition. Among animals apes are

readily inoculated, in comparison with many other species. These cases have relative significance only, and the immunity or susceptibility is doubtless due largely to secondary factors. The author does not believe in an essential immunity. The secondary influences, which are numerous, need not be cited here; of special interest, however, is one-sided trachoma, in which we have to admit immunity for the other eye. Does an eye which has recovered from trachoma possess acquired immunity? This question is at present unanswerable, as a new infection might be a relapse. Many experiments have been made to determine whether general immunity can be conferred, with a view to successful serotherapy. Thus far little progress has been made.

The study of artificial or inoculation trachoma in animals has resulted in a very large literature, involving both the discharge and trachomatous tissue. The large anthropoids, which come nearest to man, sometimes give negative results. Again, in some experiments a mild, short-lived atypical trachoma has resulted. Ordinary laboratory animals are said to be quite immune. The lower apes show most conflicting results. Evidently all must depend on quality of matter inoculated, technique of inoculation, protection of conjunctiva after inoculation, and various minor factors. The lesions produced in positive results also show notable variations. For example, even the higher apes, the lesions produced are very mild in character, often without production of follicles. All cases readily healed without scar formation save one (case of Boening) and without pannus. However not enough attention has been paid to the possibility of microscopic scars. In any case we cannot escape the conclusion that the inoculation trachoma of the ape is a true trachoma. Thus the inoculation period is the same (seven to ten days), the histological picture is the same, in the ape trachoma and the mild cases in man. The so-called "inclusion bodies" have sometimes been seen in ape trachoma.

Naturally attempts have been made to produce a nonfiltrable trachoma virus. Some notably positive results have been published, in which a most intensive technique was used, but the majority of experiments gave negative results. Some of the positive results were obtained with the conjunctival

scrapings of a so-called "inclusion blennorrhea" (thus far the author has as far as possible avoided this topic because it is considered very fully later).

He now takes up the Prowazek bodies, which he terms briefly "P. K." Prowazek, not an ordinary bacteriologist but a special student like Schaudinn of protozoa, entered the trachoma field in 1907 simply as a zoölogist. The so-called—by him—epithelial inclusions found in trachoma discharges have been named in his honor "P. K." (Prowazekche Körperchen).

After a probationary period Prowazek's findings were accepted by ophthalmologists as something to be reckoned with. The bodies were soon recognized in all parts of the world. The general finding was that P. K. are not invariably present in trachoma, while exceptionally they are to be recognized in blennorrhea neonatorum whether or not due to gonococcus. They were also found in the genital discharges, and clinical trachoma was set up in an ape from a human vaginal discharge. It was not shown whether the P. K. were themselves parasites.

P. K. have been found a few times in the seemingly normal conjunctiva. They also occur at times in non-gonococcic blennorrhea neonatorum. In the absence of other germ, it is proper to speak of an "inclusion blennorrhea," as a disease entity. Do the P. K. occur in the conjunctiva under conditions other than trachoma and ophthalmia neonatorum? Findings differ extremely, but if we go by positive results they may occur exceptionally in almost any form of acute and chronic conjunctivitis; spring catarrh and diplobacillus conjunctivitis are especially mentioned in this connection.

Leber and Prowazek have described a specific condition alleged to be due to the P. K., namely "epitheliosis desquamativa conjunctivæ." This has been regarded by some as an acute trachoma. The P. K. have also been suggested as the cause of swimming-bath conjunctivitis, ordinary granular lids, contagious vaginitis in animals (cows), etc.

As to the relative frequency of P. K. the consensus of statistics shows that they are more common in fresh, secreting cases of trachoma, and almost absent in the very late, cicatricial stage. Dividing all material into fresh and old cases, the percentages appear to be 52% in recent and 12% in old cases.

Hence about 36% show the P. K. It must be borne in mind that recent and old cases are sometimes very difficult to distinguish, and that numerous statistics do not include "scar" cases. There is much variability connected with country, race, etc.

P. K. have been found in trachomatous pannus (their occurrence in the cornea in pannus is doubtful). They do not occur in the inflamed lacrimal sac but have been seen in the secretion.

In regard to the morphology, cultural and tinctorial qualities of the P. K., these have all been worked out by Prowazek, Halberstädter, and others, but their nature is still unknown They lie beside the nucleus in the epithelial cell. Certain authors regard them as products of diseased epithelia. In any case the epithelia which contain them are diseased. One school of observers insists that the P. K. penetrate into normal cells and disorganize them, while another holds that the P. K. are secondary parasites and appear only after the epithelia have become diseased from other causes. The P. K. occur in greatest abundance in the conjunctival folds.

In the study of the P. K. their appearance in sections must be compared with that in smears. Most of the work has been done with smears. Lindner having called attention to differences which prevail between the two, the author was moved to study thoroughly section preparations.

Lindner has called attention to certain "free initial bodies" in smears which may or may not represent a form of P. K. These have been termed I. K. (Initial Körperchen) and it is assumed in some quarters the P. K. are preceded by the I. K. or at least appear simultaneously. The free I. K. resemble cocci, in part diplococci. They are occasionally seen in sections and have been regarded by some as the true parasitic cause of the disease.

It is self-evident that if the P. K. excite trachoma they must be present in the follicles. There has been much argument over various findings, but while technical devices have seemed to prove this presence, the weight of conflicting evidence must leave the question undecided.

The author's studies have satisfied him that the P. K. in the secretions agree in every way with those in the sections.

Are P. K. cell products? Are they artefacts? Are they altered nuclei? Do they arise from the cell protoplasm? Do they represent a mucin degeneration? Not one of these questions can be answered in the affirmative with certainty. In some cases negative conclusions seem quite justified.

This leads up to the parasitic theory. There the testimony of the zoölogist should be of paramount value. The resemblance between the P. K. and certain findings in the pocks of the variola is remarkable. Döflein, the prominent protozoölogist, examined the author's smears and sections and said that nothing but the culture test was needed to show that the P. K. were living organisms. Prowazek believes that some of his experiments on the orang proved the same thing. The existence of the initial bodies (I. K.) suggests the view of a mutation. The same double formation is seen in variolous matter (Guarnieri's bodies and fine punctate bodies some of which pass through a Berkfeld filter).

On the other hand, Halberstädter and Lindner state that cytology ignores the existence of the P. K.; the latter cannot be a unicellular organism. Can the P. K. be the exciting cause of trachoma? or are they "companion parasites"? Much may be said *pro* and *con;* some observers have their own views; there is no general consensus of opinion. The Vienna ophthalmologists once represented the view that gonorrhea neonatorum was the cause of trachoma, the latter being only a chronic gonorrheal conjunctivitis. This was before Neisser discovered the gonococcus, but even in the latter's absence this single viewpoint seems disproven. However, very serious attempts by Herzog and others have recently been made to reopen this question, even to the extent of claiming a mutation between the P. K. and gonococcus.

The "identity" theory of Herzog and others and the arguments advanced against it need not be repeated here; for the author, while greatly commending Herzog's work, concludes without hesitation that the P. K. cannot be derived from the gonococcus nor from any other form of microörganism. Whether the gonococcus can cause clinical trachoma is of course another matter. Gorbunow claims that he can cure trachoma with gonococcus vaccine, but claims of this sort have not been confirmed.

A special problem is relationship between inclusion blennorrhea of the newly born and trachoma of the adult. Naturally cases in which gonococci are present cannot be used for research. Inclusion blennorrhea has been described as occurring in the vagina near the rim, from which locality it has been transmitted to the conjunctiva of the ape. There are numerous forms of inclusion blennorrhea in which the P. K. occur. The author devotes much space to the clinical phenomena of inclusion blennorrhea. It begins as an acute process. In comparison with gonorrhea it is less violent, although otherwise resembling it. Unlike gonorrhea it passes into a trachoma-like condition, which, however, is mild and transitory. In nearly half the cases it is unilateral. After recovery P. K. often remain in the conjunctiva. Are trachoma and inclusion blennorrhea one and the same disease? Inoculation of one does not immunize against the other. However the consensus of opinion and the author's own views justify the belief that the P. K. of inclusion blennorrhea can cause clinical trachoma. Such cases may appear sporadically in trachoma-free countries without known exposure. There epidemic trachoma always spreads as such.

Recently Meyerhof of Cairo saw in young infants (up to three weeks old), during 1909–1913, four or five cases of inclusion blennorrhea and none of trachoma. He has never seen the latter develop before the fourth month. Noguchi and Cohen, after having reported on the absence of P. K. in gonorrheal ophthalmia in the newly born and adults, discovered both P. K. and gonococci in abundance in 29 out of 30 infants involved in an epidemic of blennorrhea. In common with others they also refuted the claim of Williams and others that the P. K. represent mutation forms of virulent bacteria.

Noguchi and Cohen also noted the transmission of inclusion blennorrhea from an infant to the mother. Other studies by these authors seem to show that among the same material genuine trachoma, inclusion blennorrhea, and gonococcic conjunctivitis may exist side by side. Cohen also followed up the inclusion blennorrhea epidemic above mentioned and was able to show that sequelæ of trachoma never developed.

Many pages are devoted to culture experiments with

P. K. It is not yet decided whether these are parasites; if they prove to be so it remains to be shown that they cause trachoma.

This investigation should be continued. An important point to determine is whether or not the real virus can be filtered. We have some positive findings to that effect; enough, the author believes, to settle the question permanently. The recent work of Gebb in this direction is mentioned.

Noguchi's experiments in culture attempts are mentioned as of special importance. He succeeded in causing the growth of certain organisms resembling the so-called I. K.; no P. K. were found. He regards the I. K. as the parasites. The author caused these experiments to be repeated with partial success, but could not obtain a pure culture. Thus far no positive inoculations have been reported.

The author devotes several pages to protozoa findings by Czaplewski, cell studies by Junius, and blastomycetic findings. These are in opposition to the work of Prowazek, and the author does not believe that they have seriously disturbed the findings and conclusions of the latter.

Extracts from conclusions not emphasized in the abstract:

Experimental trachoma is "acute" in many cases because of the artificial conditions of inoculation.

Germ-free trachomatous matter and secretion are transmissible, but not always contagious.

Trachoma without follicles is unknown in man.

Unilateral trachoma need not mean local immunity.

Trachoma virus shows little resistance to heat, etc.

The genital P. K. virus can cause an inclusion blennorrhea of the newly born which clinically is indistinguishable from trachoma, but runs a benign course.

Filtrates of both viruses are inoculable. This is not the case with any other eye microörganisms.

The two viruses may cause the same lesions in the ape. In both cases the so-called I. K. may be responsible.

P. K. occur in diseased cells but also in normal cells; some cells seem tolerant of their presence, others less so. They are probably exciters of disease.

In free secretion the I. K. possess significance, for P. K. may be absent.

If P. K. are parasites, I. K. doubtless represent a phase of them.

There may be two kinds of P. K. having the same morphology. P. K. are non-specific, and many solid arguments show that they may not be the essential cause of trachoma, although it is very likely that they are the determining cause and perhaps contain the parasite.

The evidence that P. K. cause inclusion blennorrhea of the newly born is much stronger than that concerning trachoma. P. K. are present in abundance in secretions, and are readily recognized by Gram's staining.

P. K. can therefore be held wholly responsible for a special form of conjunctivitis.

The genito-urinary men and gynecologists should study P. K. disease of the genitals.

The solution of the trachoma problem must be found in further study of the Prowazek bodies.

M. COHEN.